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Galor, Oded and Özak, Ömer

Brown University, Southern Methodist University

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Oded Galor† and Ömer Özak‡

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Abstract

This research explores the origins of observed differences in time preference across countries and regions. Exploiting a natural experiment associated with the expansion of suitable crops for cultivation in the course of the Columbian Exchange, the research establishes that pre-industrial agro-climatic characteristics that were conducive to higher return to agricultural investment, triggered selection, adaptation and learning processes that generated a persistent positive effect on the prevalence of long-term orientation in the contemporary era. Furthermore, the research establishes that these agro-climatic characteristics have had a culturally embodied impact on economic behavior such as technological adoption, education, saving, and smoking.

Keywords: Time preference, Delayed Gratification, Cultural Evolution, Economic Development, Comparative Development, Human Capital, Education, Saving, Smoking

JEL Classification: D14, D90, E21, I12, I25, J24, J26, O10, O33, O40, Z1

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†Department of Economics, Brown University. E-mail: Oded_Galor@brown.edu

‡Department of Economics, Southern Methodist University. E-mail: ozak@smu.edu

1 Introduction

"Patience is bitter, but its fruit is sweet." – Aristotle

The rate of time preference has been largely viewed as a pivotal factor in the determination of human behavior. The ability to delay gratification has been associated with a variety of virtuous outcomes, ranging from academic accomplishments to physical and emotional health.[1] Moreover, in light of the importance of long-term orientation for human and physical capital formation, technological advancement, and economic growth, time preference has been widely considered as a fundamental element in the formation of the wealth of nations. Nevertheless, despite the central role attributed to time preference in comparative development, the origins of observed differences in time preference across societies have remained obscured.[2]

This research explores the coevolution of time preference and economic development in the course of human history, uncovering the origins of the distribution of time preference across countries and regions. It advances the hypothesis, and establishes empirically that geographical variations in the natural return to agricultural investment generated a persistent effect on the distribution of time preference across societies. In particular, exploiting a natural experiment associated with the expansion of suitable crops for cultivation in the course of the Columbian Exchange (i.e., the pervasive exchange of crops between the New and Old World; Crosby, 1972), the research establishes that pre-industrial agro-climatic characteristics that were conducive to higher return to agricultural investment triggered selection, adaptation and learning processes that have had a persistent positive effect on the prevalence of long-term orientation in the contemporary era. Furthermore, the research establishes that these agro-climatic characteristics have had a culturally embodied impact on economic behavior such as technological adoption, human capital formation, the propensity to save, and the inclination to smoke.

The proposed theory generates several testable predictions regarding the effect of the natural return to agricultural investment on the rate of time preference. The theory suggests that in societies in which the ancestral population was exposed to a higher crop yield (for a given growth cycle), the rewarding experience in agricultural investment triggered selection, adaptation and learning processes which have gradually increased the representation of traits for higher long-term orientation in the population. Thus, descendants of individuals who resided in such geographical regions are characterized by higher long-term orientation. Moreover, the theory further proposes that societies that benefited from the expansion in the spectrum of suitable crops in the post-1500 period experienced further gains in the degree of long-term orientation.

The empirical analysis exploits an exogenous source of variation in potential crop yield and growth cycle across the globe to analyze the effect of pre-industrial crop yields on various measures of long-term orientation at the country, region, and individual levels. Consistent with the predictions

[1] The consequences of the ability to delay gratification and to exert self-control have been studied extensively (Ayduk et al., 2000; Dohmen et al., 2010; Mischel and Ebbesen, 1970; Mischel et al., 1988, 1989; Shoda et al., 1990).

[2] The evolutionary forces that underline time-discounting and their consequences for human behavior have been explored by Loewenstein and Elster (1992), Laibson (1997), Frederick et al. (2002), Stevens and Hauser (2004), Rosati et al. (2007), and Fawcett et al. (2012).

of the theory, the empirical analysis establishes that indeed higher potential crop yield experienced by ancestral populations during the pre-industrial era, increased the long-term orientation of their descendants in the modern period.

The analysis establishes this result in five layers: (i) a cross-country analysis that accounts for the confounding effects of a large number of geographical controls, the onset of the Neolithic Revolution, as well as continental fixed effects; (ii) a within-country analysis across second-generation migrants that accounts for host country fixed effects, geographical characteristics of the country of origin, as well as migrants' individual characteristics, such as gender and age; (iii) a cross-country individual-level analysis that accounts for the country's geographical characteristics as well as individuals' characteristics, such as income and education; (iv) a cross-regional individual-level analysis that accounts for the region's geographical characteristics, individuals' characteristics, and country fixed-effects; and (v) a cross-regional analysis that accounts for the confounding effects of a large number of geographical controls, as well as country fixed-effects.

The research introduces novel measures of potential caloric yield and crop growth cycle for each cell of size $5' \times 5'$ (approximately 100km^2) across the globe. These measures estimate the potential (rather than actual) caloric yield per hectare per year, under low level of inputs and rain-fed agriculture, capturing cultivation methods that characterized early stages of development, while removing potential concerns that caloric yields reflect endogenous choices that could be affected by time preference. Moreover, the estimates are based on agro-climatic constraints that are largely orthogonal to human intervention, mitigating further possible endogeneity concerns.

The analysis accounts for a wide range of potentially confounding geographical factors that might have directly and independently affected the reward for a longer planning horizon, and hence, the formation of time preference. In particular, it controls for the effects of absolute latitude, average elevation, terrain roughness, distance to navigable water, as well as islands and landlocked regions. Additionally, it accounts for climatic variability, and thus the risk that was associated with fluctuations in food supply, as well as for geographical factors that may have affected trade, and therefore the planning horizon. Furthermore, unobserved geographical, cultural, and historical characteristics at the continental level may have codetermined the global distribution of time preference. Hence, the analysis accounts for these unobserved characteristics by the inclusion of a complete set of continental fixed effects. Moreover, when the sample permits, the analysis accounts for unobserved heterogeneity at the country level by the inclusion of country fixed-effects.

The research exploits a natural experiment associated with the Columbian Exchange (i.e., the expansion of suitable crops for cultivation in the post-1500 period) to mitigate possible concerns relating to: (i) the historical nature of the effect of caloric yield on long-term orientation, (ii) the role of omitted regional characteristics, and (iii) the relative impact of potential sorting of high long-term orientation individuals into high yield regions. First, the Columbian Exchange permits the establishment of the historical nature of the effect of these geographical characteristics as opposed to a potential contemporary link between geographical attributes, development outcomes and the rate of time preference. In particular, restricting attention to crops that were available for cultivation in the pre-1500CE era, permits the identification of the historical nature of the effect.

Second, the Columbian Exchange diminishes concerns about the role of omitted regional characteristics in the observed association. The Columbian Exchange increases the potential crop yield if and only if the *potential* yield of some newly introduced crop is larger than the potential yield of the originally dominating crop. Hence, a priori, by construction, conditional on the potential pre-1500CE crop yield, the potential assignment of crops associated with this natural experiment ought to be independent of any other attributes of the grid, and the estimated causal effect of the change in potential crop yield is unlikely to be driven by omitted characteristics of the region.

Third, the natural experiment associated with the Columbian Exchange provides the necessary ingredients to assess the relative contributions of the forces of cultural evolution and sorting in the post-1500 era. Indeed, the association between crop yield and time preference could also be attributed to the potential sorting of high long-term individuals into high yield regions. While this sorting process would not affect the nature of the results (i.e., variations in the return to agricultural investment across the globe would still be the origin of the differences in time preference), it would undermine the cultural interpretation of the underlying mechanism. However, if changes in crop yield in the course of the Columbian Exchange affect time preference, once cross-country migrations over this period are accounted for, this effect is unlikely to capture sorting but rather cultural evolution in the post-1500 era.

The first part of the empirical analysis examines the effect of crop yield on the rate of time preference across countries. Using a country-level measure of time preference, as proxied by the index of Long-Term Orientation (Hofstede, 1991), the analysis establishes that, conditional on crop growth cycles, higher pre-industrial caloric yield has a positive effect on Long-Term Orientation in the modern period. The findings are robust to the inclusion of continental fixed-effects, a wide range of confounding geographical characteristics, and the years elapsed since the country transitioned to agriculture. In particular, the estimates suggest that a one-standard deviation increase in potential crop yield increases a country's Long-Term Orientation by about half a standard deviation.

Moreover, the analysis establishes that crop yield has had primarily a direct effect on time preference rather than an indirect one via the process of development. In particular, accounting for the potential effect of higher crop yield on pre-industrial population density, urbanization, and GDP per capita, and their conceivable persistent effect on contemporary development, does not affect the qualitative results. Furthermore, while effective caloric yield in a given region might have been affected by climatic risks, spatial diversification, and trade, the results are robust to the inclusion of these additional factors into the analysis.

Furthermore, the results suggest that it is the portable, culturally embodied component of the effect of potential crop yield that has a long-lasting effect on the time preference. In particular, the effect on long-term orientation of the crop yield in a population's ancestral homeland is stronger than the effect of crop yield in its current geographical location. Additionally, the empirical analysis establishes that long-term orientation is the main cultural characteristic determined by potential crop yield. Crop yield has a largely insignificant effect on country-level measures of individualism or collectivism, internal cooperation or competition, tolerance and rigidness, hierarchy and inequality of power, trust, and uncertainty avoidance. Moreover, the effect of crop yield on long-term orientation is not mediated by these cultural characteristics.

The second part of the empirical analysis examines the effect of crop yield in the parental country of origin on the long-term orientation of second-generation migrants. This analysis accounts for host country fixed-effects, mitigating possible concerns about the confounding effect of host country-specific characteristics such as geography, culture and institutions. Moreover, this setting assures that the effect of crop yield on long-term orientation captures cultural elements that have been transmitted across generations, rather than the direct effect of geographical attributes at the country of origin, or the effect of omitted characteristics of the host country (Fernández, 2012; Giuliano, 2007; Guiso et al., 2004). In line with the theory, these findings suggest that higher crop yield in the parental country of origin has a positive, statistically and economically significant effect on the long-term orientation of second-generation migrants, accounting for the confounding effect of individual characteristics, a wide range of geographical attributes of the parental country of origin, as well as the number of years since the parental country of origin transitioned to agriculture.

The third part of the empirical analysis explores the effect of crop yield on individual's long-term orientation in the World Values Survey, both across countries as well as across regions within a country. The results lend further credence to the proposed theory. In particular, they show that the probability of having long-term orientation increases for individuals who live in a region with higher crop yield. This result is robust to the inclusion of continental fixed effects, and a wide range of confounding geographical as well as individual characteristics.

Finally, the analysis establishes the association between time preference and comparative development in three different layers. First, ethnic groups whose ancestral populations were exposed to higher crop yield in the pre-1500 era had a higher probability of adopting major technological innovations. Second, potential crop yield has a significant effect on saving and smoking behavior of second-generation migrants. Third, higher crop yield is positively associated with investment in human capital across countries.

This research constitutes the first attempt to decipher the biogeographical origins of variations in time preference across the globe. Moreover, it sheds additional light on the geographical and bio-cultural origins of comparative development (e.g., Ashraf and Galor, 2013; Diamond, 1997), the interaction between the evolution of human traits and the process of development (Galor and Moav, 2002; Spolaore and Wacziarg, 2013), and the persistence of cultural characteristics (e.g., Alesina et al., 2013; Belloc and Bowles, 2013; Bisin and Verdier, 2000; Fernández, 2012; Nunn and Wantchekon, 2011).

2 The Model

This section develops a dynamic model that captures the evolution of time preference during the agricultural stage of development – a Malthusian era in which individuals that generated more resources had larger reproductive success (Ashraf and Galor, 2011; Dalgaard and Strulik, 2015; Vollrath, 2011). The evolution of time preference is based on four elements: occupational choice, learning, reproductive success, and intergenerational transmission. First, individuals characterized by higher long-term orientation choose agricultural practices that permit higher but delayed return. Second, the engagement of individuals with long-term orientation in profitable investment ventures mitigates their tendency to discount the future and reinforces their ability to delay gratification. Third, the superior economic outcomes of individuals with long-term orientation increases their reproductive success. Fourth, since time preference is transmitted intergenerationally, the engagement in occupations associated with higher yields and, thus, with higher reproductive success, gradually increases the representation of high long-term orientation individuals in the population.[3] Thus, societies characterized by greater return to agricultural investment are also characterized by higher long-term orientation in the long run.

Consider an overlapping-generations economy in an agricultural stage of development. In every time period the economy consists of three-period lived individuals who are identical in all respects except for their rate of time preference. In the first period of life - childhood - agents are economically passive and their consumption is provided by their parents. In the second and third periods of life, individuals have access to identical land-intensive production technologies that allow them to generate income by hunting, fishing, herding, and land cultivation. Some of the available modes of production require investment (e.g., planting) and delayed consumption, and thus, in the absence of financial markets, individuals' occupational choices reflect their rate of time preference.

2.1 Production

Adult individuals face the choice between two modes of agricultural production: an endowment mode and an investment mode. The endowment mode exploits the existing land for hunting, gathering, fishing, herding, and subsistence agriculture. It provides a constant level of output, $R^0 > 1$, in each of the two working periods of life. The investment mode, in contrast, is associated with planting and harvesting of crops. It requires an investment in the first working period, leaving the individuals with 1 unit of output, but it provides a higher level of resources, R^1, in the second working period. In particular, $\ln(R^1) > 2\ln(R^0)$.[4]

Hence, depending on the choice of production mode, the income stream of member i of generation t (born in period $t-1$) in the two working periods of life, $(y_{i,t}, y_{i,t+1})$, is

$$(y_{i,t}, y_{i,t+1}) = \begin{cases} (R^0, R^0) & \text{under endowment mode} \\ (1, R^1) & \text{under investment mode.} \end{cases} \tag{1}$$

[3] Bowles (1998), Bisin and Verdier (2000), Galor and Moav (2002), Rapoport and Vidal (2007), Doepke and Zilibotti (2008), and Galor and Michalopoulos (2012) explore additional mechanisms that may govern the evolution of preferences. Moreover, Dohmen et al. (2012) establish empirically the presence of intergenerational transmission of risk aversion and trust and the importance of socialization in this transmission process.

[4] For simplicity, agricultural productivity is constant over time. Constant productivity of labor reflects a Malthusian-Boserupian economy in which the adverse effect of population on the labor productivity is mitigated by the advancement in technology generated by the scale of the population.

2.2 Preferences and Budget Constraints

In each period t, a generation consisting of L_t individuals becomes economically active. Each member of generation t is born in period $t-1$ to a single parent and lives for three periods. Individuals generate utility from consumption in each period of their working life and from the number of their children. The preference of a member i of generation t is represented by the utility function:

$$u^{i,t} = \ln c_{i,t} + \beta_t^i[\gamma \ln n_{i,t+1} + (1-\gamma)\ln c_{i,t+1}]; \qquad \gamma \in (0,1), \tag{2}$$

where $c_{i,t}$ and $c_{i,t+1}$ are the levels of consumption in the first and the second working periods of member i of generation t and $n_{i,t+1}$ is the individual's number of children. Furthermore, $\beta_t^i \in (0,1]$ is individual i's discount factor, i.e., $\beta_t^i \equiv 1/(1+\rho_t^i)$, where $\rho_t^i \geq 0$ is the rate of time preference of member i of generation t.

In the first working period, in the absence of financial markets and storage technologies, member i of generation t consumes the entire income, $y_{i,t}$. Hence, consumption of member i of generation t in the first working period, $c_{i,t}$, is $c_{i,t} = y_{i,t}$. In the last period, member i of generation t allocates her income, $y_{i,t+1}$, between consumption, $c_{i,t+1}$, and expenditure on children, $\tau n_{i,t+1}$, where τ is the resource cost of raising a child. Hence, the budget constraint of individual i of generation t in the last period of life is $\tau n_{i,t+1} + c_{i,t+1} = y_{i,t+1}$.

2.3 Allocation of Resources between Consumption and Children

Members of generation t allocate their last period income between consumption and child rearing so as to maximize their utility function subject to the budget constraint. Given the homotheticity of preferences, individuals devote a fraction $(1-\gamma)$ of their last period income to consumption and a fraction γ to child rearing. Hence, the level of last period consumption and the number of children of member i of generation t, $c_{i,t+1}$ and $n_{i,t+1}$, are $c_{i,t+1} = (1-\gamma)y_{i,t+1}$ and $n_{i,t+1} = \gamma y_{i,t+1}/\tau$. Given these optimal choices, the level of utility generated by member i of generation t is therefore, $v^{i,t} = \ln y_{i,t} + \beta_t^i[\ln y_{i,t+1} + \zeta]$, where $\zeta \equiv \gamma \ln(\gamma/\tau) + (1-\gamma)\ln(1-\gamma)]$.

2.4 Occupational Choice

Each member i of generation t chooses the desirable mode of production that maximizes life time utility, $v^{i,t}$. Differences in the desirable mode of production across individuals reflect variations in their rate of time preference.

Given the discount factor, β_t^i, the life time utility of a member i of generation t, $v^{i,t}$, under each of the two modes of production is

$$v^{i,t} = \begin{cases} \ln R^0 + \beta_t^i[\ln R^0 + \zeta] & \text{under endowment mode} \\ \ln 1 + \beta_t^i[\ln R^1 + \zeta] & \text{under investment mode.} \end{cases} \tag{3}$$

Hence, since $\ln(R^1) > 2\ln(R^0)$, there exists an interior level of the discount factor, $\hat{\beta}$, such that an individual who possesses this discount factor is indifferent between the endowment and the investment modes of production:[5]

$$\hat{\beta} = \frac{\ln R^0}{\ln R^1 - \ln R^0} \in (0,1). \tag{4}$$

The segmentation of the population between the investment and the endowment modes of production is determined by $\hat{\beta}$. In particular, member i of generation t is engaged in the endowment mode if $\beta_t^i \leq \hat{\beta}$, and in the investment mode if $\beta_t^i > \hat{\beta}$. Furthermore, the threshold level of the discount factor above which individuals are engaged in the investment mode is lower if the return to agricultural investment, R^1, is higher, i.e.,

$$\frac{\partial \hat{\beta}}{\partial R^1} = \frac{-\ln R^0}{R^1[\ln R^1 - \ln R^0]^2} < 0. \tag{5}$$

2.5 Time Preference, Income and Fertility

The income stream of member i of generation t in the two working periods, $(y_{i,t}, y_{i,t+1})$, is determined by the threshold level of the discount factor, $\hat{\beta}$. In particular,

$$(y_{i,t}, y_{i,t+1}) = \begin{cases} (R^0, R^0) & \text{if} \quad \beta_t^i \leq \hat{\beta} \\ (1, R^1) & \text{if} \quad \beta_t^i > \hat{\beta}. \end{cases} \tag{6}$$

Consequently, the number of children of member i of generation t is determined by the threshold level of the discount factor, $\hat{\beta}$, such that

$$n_{i,t+1} = \frac{\gamma y_{i,t+1}}{\tau} = \begin{cases} \frac{\gamma}{\tau} R^0 \equiv n^E & \text{if} \quad \beta_t^i \leq \hat{\beta}; \\ \frac{\gamma}{\tau} R^1 \equiv n^I & \text{if} \quad \beta_t^i > \hat{\beta}. \end{cases} \tag{7}$$

Hence, since $R^1 > R^0$, the number of children of individuals engaged in the investment mode of production, n^I, is larger than that of individuals engaged in the endowment mode, n^E, i.e., $n^I > n^E$.[6]

[5] The assumption that $\ln(R^1) > 2\ln(R^0)$ assures that the investment mode is profitable for some but not all individuals. Nevertheless, the qualitative analysis will not be altered if all individuals choose the investment mode.

[6] Consistent with various interpretations of the nature of the endowment mode in the model (e.g., subsistence agriculture, hunting and gathering), empirical evidence suggests that fertility rates in the post-Neolithic era are higher than among hunter and gatherers. In particular, the *Neolithic Demographic Transition* was associated with "a sharp increase in birthrates as populations [...] adopted sedentary lifestyles and food storage, reduced their birth intervals, and came to depend increasingly on food production as opposed to foraging." (Bocquet-Appel and Bar-Yosef, 2008). Moreover, in post-Neolithic societies fertility rates are positively related to income (Clark and Hamilton, 2006; Lee, 1997).

2.6 The Evolution of Time Preference

2.6.1 Evolution of Time Preference within a Dynasty

Suppose that time preference is transmitted across generations. Suppose further that the rate of time preference is affected by the experience of individuals over their life time.[7] In particular, individuals who are engaged in the endowment mode of production maintain their inherited time preference, β_t^i, and transmit it to their offspring, whereas those who are engaged in the investment mode learn to delay gratification and transmit to their offspring an augmented discount factor that reflects this acquired tolerance.[8] Unlike the experience of individuals who are engaged in the endowment mode of production that has no impact on their rate of time preference, the experience of individuals who are engaged in the investment mode provides a positive reinforcement to their patience, enhancing their ability to delay gratification.

The degree of long-term orientation transmitted by individuals of the investment type to their offspring, $\phi(\beta_t^i; R^1)$, reflects their inherited time preference, β_t^i, as well as their acquired patience due to the reward to their investment, R^1. The higher is the reward to investment, the more gratifying is the experience with delayed gratification (reflected by higher income and reproductive success), and thus, the higher is the degree of long-term orientation that they transmit to their offspring. Moreover, the higher is the inherited time preference, the higher is the degree of long-term orientation transmitted to the offspring. Indeed, evidence suggests that larger rewards to delayed gratification reinforce the ability to delay gratification even further (Dixon et al., 1998; Mazur and Logue, 1978; Newman and Bloom, 1981; Rung and Young, 2015). Furthermore, children become more long-term oriented when observing a long-term oriented adult (Bandura and Mischel, 1965). Thus, if the contribution of the parental inherited time preference to the long-term orientation of the offspring is characterized by the law of diminishing returns, $\phi(\beta_t^i; R^1)$ is an increasing, strictly concave function of the parental inherited time preference, β_t^i.

Hence, as depicted in Figure 1, the time preference that is inherited by a member i of generation $t+1$, β_{t+1}^i, is

$$\beta_{t+1}^i = \begin{cases} \beta_t^i & \text{if} \quad \beta_t^i \leq \hat{\beta} \\ \phi(\beta_t^i; R^1) & \text{if} \quad \beta_t^i > \hat{\beta}, \end{cases} \tag{8}$$

where for any β_t^i, $\beta_t^i \leq \phi(\beta_t^i; R^1) < 1$; $\phi(\hat{\beta}; R^1) > \hat{\beta}$; $\phi_\beta(\beta_t^i; R^1) > 0$; $\phi_R(\beta_t^i; R^1) > 0$; $\phi_{\beta\beta}(\beta_t^i; R^1) < 0$.

As depicted in Figure 1, if the time preference of member i of generation 0 is below the threshold $\hat{\beta}$, the individual chooses the endowment mode and the time preference of each member of the individual's dynasty remains at β_0^i. In particular, if $\beta_0^i \leq \hat{\beta}$ then $\lim_{t\to\infty} \beta_t^i = \beta_0^i$. In contrast, if $\beta_0^i > \hat{\beta}$, then member i of generation 0 chooses the investment mode and the evolution of time preference within individual i's dynasty converges to a unique steady-state level $\bar{\beta}^I(R^1) > \hat{\beta}$, such that $\bar{\beta}^I = \phi(\bar{\beta}^I; R^1)$. Hence, $\lim_{t\to\infty} \beta_t^i = \bar{\beta}^I(R^1)$.

[7] Evidence suggests that time preference is transmitted intergenerationally (Anderson and Nevitte, 2006; Arrondel, 2009; Cronqvist and Siegel, 2013; Knowles and Postlewaite, 2005; Webley and Nyhus, 2006) and is affected by individual's experience (Bowles, 1998)

[8] Allowing horizontal transmission across types would reinforce the mechanism highlighted in this paper.

2.6.2 Evolution of Time Preference Across Generations

Suppose that the time preferences of individuals in period 0 are characterized by a continuous distribution function with support $[0, \bar{\beta}^I(R^1)]$ and density $\nu(\beta_0^i)$.[9] Suppose further that the initial size of the population of generation 0 is $L_0 = 1$, i.e.,

$$L_0 = \int_0^{\bar{\beta}^I} \nu(\beta_0^i) d\beta_0^i = 1. \tag{9}$$

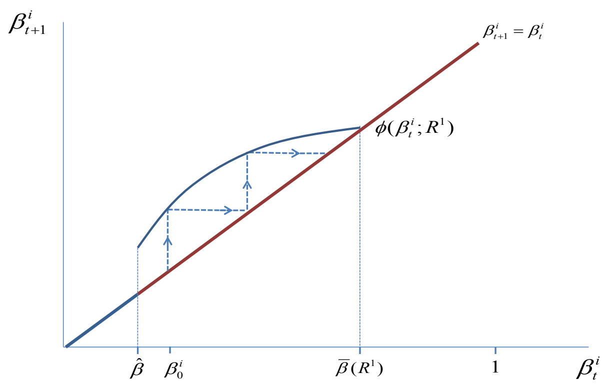


Figure 1: The Evolution of Time Preference within a Dynasty

Given the threshold level of the discount factor, $\hat{\beta}$, above which the investment mode of production is beneficial, the size of the population of generation 0 that is engaged in the endowment mode of production, L_0^E, and the size of the population of generation 0 that is engaged in the investment mode of production, L_0^I, are

$$L_0^E = \int_0^{\hat{\beta}} \nu(\beta_0^i) d\beta_0^i \qquad \text{and} \qquad L_0^I = \int_{\hat{\beta}}^{\bar{\beta}^I} \nu(\beta_0^i) d\beta_0^i. \tag{10}$$

Since the critical level, $\hat{\beta}$, is stationary over time, it follows from (8), that the distribution of β_t^i across individuals with a discount factor below $\hat{\beta}$ is unchanged over time. Additionally, income and therefore the number of children are constant over time for each group (i.e., the endowment type, E, and the investment type, I).

Thus, in generation t, the size of the population of each group is determined by its initial level and the number of children per adult:

$$\begin{aligned} L_t^E &= (n^E)^t L_0^E = (\tfrac{\gamma}{\tau} R^0)^t L_0^E; \\ L_t^I &= (n^I)^t L_0^I = (\tfrac{\gamma}{\tau} R^1)^t L_0^I, \end{aligned} \tag{11}$$

where $L_t^E + L_t^I = L_t$.

[9] Since $\hat{\beta} \in (0, \bar{\beta}^I(R^1))$, this initial condition assures that at least some individuals will be engaged in each mode of production in period 0.

The average time preference of generation t, $\bar{\beta}_t$, is therefore the weighted average of the time preference of the endowment type, $\bar{\beta}_t^E$, and of the investment type, $\bar{\beta}_t^I$. The weights are determined by the relative size of the two types in generation t. Hence, the average time preference in society in period t, $\bar{\beta}_t$, is

$$\bar{\beta}_t = \theta_t^E \bar{\beta}_t^E + (1 - \theta_t^E)\bar{\beta}_t^I, \tag{12}$$

where θ_t^E is the fraction of offsprings in generation t who are descendants from individuals engaged in the endowment mode of production in generation 0, i.e.,

$$\theta_t^E \equiv \frac{L_t^E}{L_t^E + L_t^I} = \frac{(R^0)^t}{(R^0)^t + (R^1)^t (L_0^I / L_0^E)}. \tag{13}$$

Thus, the fraction of individuals of the endowment type declines asymptotically to zero (i.e., $\lim_{t\to\infty} \theta_t^E = 0$), reflecting their lower reproductive success.

2.7 Steady-State Equilibrium

As the economy approaches a steady-state equilibrium, the fraction of individuals of the endowment type in each generation declines asymptotically to zero. Hence, it follows that the steady-state level of the average time preference in the economy, $\bar{\beta}$, is equal to steady-state level of time preference among individuals engaged in the investment mode of production, i.e., $\bar{\beta} = \bar{\beta}^I(R^1)$ where $\partial\bar{\beta}/\partial R^1 > 0$.[10] Although R^0 affects the allocation of the population between the investment and the endowment modes of production, since individuals of the investment type entirely dominate the population asymptotically, and since their time preference converges to the same long-run steady-state level $\bar{\beta}^I(R^1)$, which is independent of R^0, it follows that the steady-state level of time preference in the economy $\bar{\beta}$ is also independent of R^0.

Moreover, while an increase in the rate of return to investment, R^1, lowers the threshold level of the discount factor above which individuals will chose the investment mode of production, the gradual increase in the ability to delay gratification among individuals of the investment type, and the increase in their relative share in the population (due to higher resources and thus reproductive success) brings about an increase in steady-state level of long-term orientation in society.

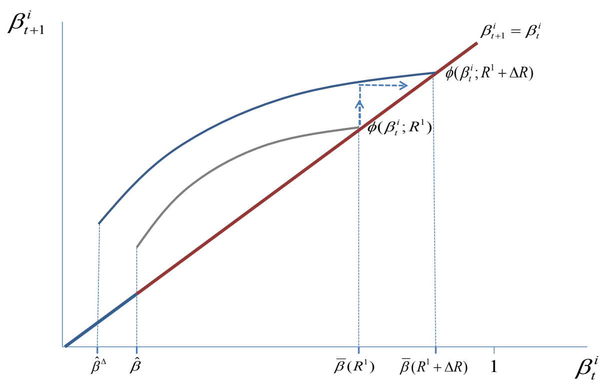
Thus, since R^0 has no persistent effect on time preference in the long-run, while R^1 has a persistent positive effect on the steady-state level of time preference, the empirical investigation of the deep determinants of contemporary time preference ought to focus on variations in R^1 across countries and regions, while disregarding potential variations in R^0 across the globe.[11]

[10] The results are robust to the inclusion of a range of investment modes. In particular, the most patient individuals will be engaged in the most productive investment mode and thus given their higher reproductive success, their time preference would dominate the population in the long-run.

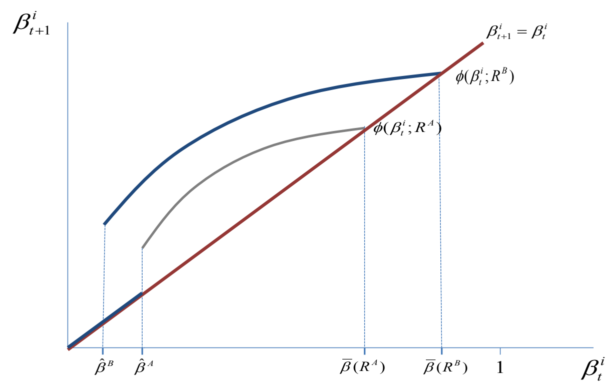
[11] While in the steady-state, for a given R^1, there is no heterogeneity in time preference within a given geographical location, regional variations in agricultural returns within a country will contribute to the observed heterogeneity in long-term orientation across regions withinn a country.

2.7.1 Independence of the Steady-State Time Preference from its Initial Distribution

As previously established, the steady-state level of time preference in the economy, $\bar{\beta}$, is independent of the initial distribution of time preference in the population as long as the support of the distribution function is $[0, \bar{\beta}]$. Thus, changes in the initial distribution can only have temporary effects on time preference, as long as the support of the distribution function remains $[0, \bar{\beta}]$. In particular, if sorting occurs, and individuals with high long-term orientation sort themselves into environments in which the return to agricultural investment is higher, this sorting would affect the level of time preference during the transition to the steady state, but would not affect the long run time preference in the economy.



(a) Effect of the Introduction of New Potential Crops



(b) Time Preference Across Countries $R^B > R^A$

Figure 2: Comparative Dynamics

2.7.2 The Effect of an Increase in Crop Yield on Time Preference

Suppose that after the economy reaches the steady-state equilibrium, $\bar{\beta}^I(R^1)$, new crops are introduced and the return to the investment mode increases from R^1 to $R^1 + \Delta R$. As depicted in Figure 2(a) and as follows from (5) and the properties of $\phi(\beta_t; R^1)$, the rise in R^1 decreases the threshold level to $\hat{\beta}^\Delta$ while shifting $\phi(\beta_t; R^1)$ upwards. Hence, the economy gradually transitions to a higher steady-state equilibrium $\bar{\beta}^I(R^1 + \Delta R)$, and the introduction of new crops increases long-term orientation. Moreover, consider two countries, A and B, identical in all respects except for their return to the investment mode of production. Suppose $R^A < R^B$, then as depicted in Figure 2(b), the high return country, B, will have a higher long-term orientation in the steady-state (i.e., $\bar{\beta}(R^B) > \bar{\beta}(R^A)$).

2.7.3 The Effect of an Increase in Crop Growth Cycle on Time Preference

While the waiting period in the basic model is equal to one by construction, a simple extension of the model captures the effect of an increase in the waiting period on the rate of time preference. Suppose that the rate of time preference that is transmitted intergenerationally by parents of the investment type is affected by their inherited time preference, their acquired patience due to the reward to their investment, as well as the length of the delay in the reward that is associated with this investment. In particular, suppose that the subjective reward from this investment, R, is a positive function of the actual resources generated by this investment, R^1, and a decreasing function of the waiting period, θ, i.e., $R = \xi(R^1, \theta)$, where $\partial\xi/\partial R^1 > 0$ and $\partial\xi/\partial\theta < 0$.[12]

Generalizing the transmission of the time preference across generations who are engaged in the investment mode, to account for the effect of the duration of the waiting period, it follows that

$$\beta^i_{t+1} = \phi(\beta^i_t, \xi(R^1, \theta), \theta), \tag{14}$$

where $\partial\phi/\partial j > 0$ for $j = \beta^i_t, R, \theta$. In particular, holding the subjective reward from investment constant, R, the longer is the waiting period, θ, the higher is the acquired tendency to delay gratification (i.e., $\partial\phi/\partial\theta > 0$).

Thus, an increase in the duration of the waiting period has conflicting effects on the evolution of time preference for individuals of the investment type. In particular,

$$\frac{d\beta^i_{t+1}}{d\theta} = \frac{\partial\phi(\beta^i_t, \xi(R_1, \theta), \theta)}{\partial R}\frac{\partial R}{\partial\theta} + \frac{\partial\phi(\beta^i_t, \xi(R_1, \theta), \theta)}{\partial\theta} \gtreqless 0. \tag{15}$$

On the one hand, an increase in the waiting period, holding R^1 constant, is equivalent to a decrease in the subjective reward, and hence it reduces the rewarding effect of investment on the individual's ability to delay gratification. However, the unavoidable increase in the waiting period that is associated with this higher reward, on the other hand, mitigates the aversion from delayed consumption.

Thus, following the analysis in section 2.7 the economy's average rate of time preference converges to a steady-state level, $\bar{\beta}(R^1, \theta)$, where $\partial\bar{\beta}(R^1)/\partial R^1 > 0$ and $\partial\bar{\beta}(R^1, \theta)/\partial\theta \gtreqless 0$.

2.8 Testable Predictions

The model generates several testable predictions regarding the relationship between crop yield and time preference. First, the theory suggests that across economies identical in all respects except for their return to agricultural investment, the higher the crop yield, the higher the long-term orientation in the long-run. In particular, given the crop growth cycle, the higher is the crop yield, the higher is the average level of long-term orientation. Second, the theory suggests that the expansion in the spectrum of potential crops in the post-1500 period generated an additional increase in the degree of long-term orientation in society, beyond the initial level generated by the pre-1500 crops. Third, the theory suggests that an increase in the crop growth cycle generates conflicting effects on the rate of time preference. On the one hand, an increase in the crop growth cycle, holding the crop yield constant, is equivalent to a reduction in the return on investment, and hence it reduces the effect of rewarding investment experience on the ability to delay gratification. However, the increase in the duration of the investment mitigates the aversion from delayed consumption. Thus, the overall effect is ambiguous.

[12]For instance, if R is the daily return to agricultural investment, i.e., if $R = R^1/\theta$, an increase in R^1 increases the daily return whereas an increase in θ decreases the daily return.

3 Data and Empirical Strategy

This section presents the empirical strategy developed to analyze the effect of the return to agricultural investment on contemporary variations in the rate of time preference. It introduces novel global measures of historical potential crop yield and growth cycles that are employed in order to examine their effect on a range of proxies for time preference at the individual, regional, and national levels.[13]

3.1 Identification Strategy

The analysis surmounts significant hurdles in the identification of the causal effect of historical crop yield on long-term orientation. First, long-term orientation may affect the choice of technologies and therefore actual crop yields. Hence, to overcome this concern about reverse causality, this research exploits variations in potential (rather than actual) crop yields associated with agro-climatic conditions that are orthogonal to human intervention.

Second, the results may be biased by omitted geographical, institutional, cultural, or human characteristics that might have determined long-term orientation and are correlated with potential crop yield. Thus, several strategies are employed to mitigate this concern: (i) The analysis accounts for a large set of confounding geographical characteristics (e.g., absolute latitude, elevation, roughness, distance to the sea or navigable rivers, average precipitation, percentages of a country's area in tropical, subtropical or temperate zones, and average suitability for agriculture). (ii) It accounts for continental fixed effects, capturing unobserved time-invariant heterogeneity at the continental level. (iii) It accounts for confounding individual characteristics (e.g., age, gender, education, religiosity, marital status, and income). (iv) It conducts regional-level analyses of the effect of potential crop yield on long-term orientation, accounting for country fixed effects and thus unobserved time-invariant country-specific factors. (v) It explores the determinants of time preference in second-generation migrants, accounting for the host country fixed effects, and thus time-invariant country-of-birth-specific factors, (e.g., geography, institutions, and culture), thus permitting the identification of the importance of the portable, culturally embodied component of the effect of geography.

Third, geographical attributes that had contributed to crop yield in the past are likely to be conducive to higher crop yield in the present. In particular, the correlation between past crop yield and contemporary time preference may therefore reflect the direct impact of invariant geographical attributes on contemporary economic outcomes that may be correlated with the rate of time preference. To mitigate this concern, this research exploits the potential yield in the pre-1500 period (i.e., prior to the expansion in the spectrum of potential crops in the course of the Columbian Exchange) to identify the persistent effect of historical crop yield on long-term orientation, lending credence to the hypothesis that it is the portable, culturally embodied component of the effect of potential crop yield, rather than persistent geographical attributes that affect time preference.

Fourth, the natural experiment associated with the Columbian Exchange, and the differential

[13] Three different measures of long-term orientation at the country, region, and individual level are employed. Tables B.44 and B.45 show that these measures are highly correlated.

assignment of superior crops to different regions of the world, further mitigates potential concerns about omitted variables. In particular, in each grid, the Columbian Exchange brought about an increase in potential crop yield if and only if the potential yield of a newly introduced crop is larger than the potential yield of the originally dominating crop. Hence, a priori, by construction, conditional on the potential pre-1500CE crop yield, the potential assignment of crops associated with this natural experiment ought to be independent of any other attributes of the grid, and the estimated causal effect of the change in potential crop yield is unlikely to be driven by omitted characteristics of the region. Given the positive empirical association between crop yield and growth cycle, this natural experiment is based on the identifying assumption that, conditional on the pre-1500 distribution of potential crop yield and growth cycle, the change in the potential crop yield and growth cycle resulting from the introduction of new crops is distributed randomly, independently of any other attributes of the grid. Appendix B.2 provides supportive evidence for the plausibility of this assumption.

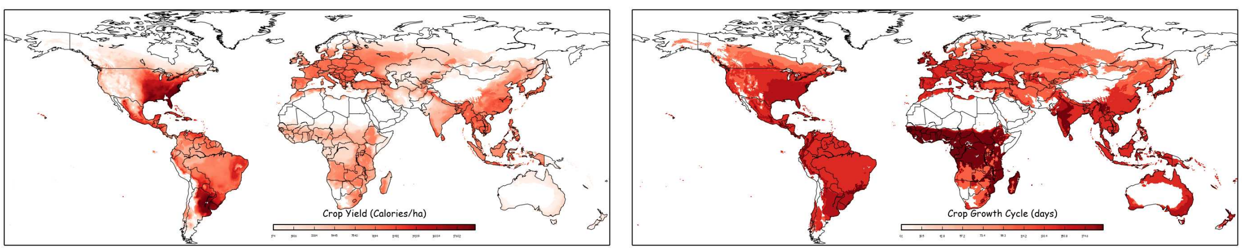
Fifth, the natural experiment associated with the Columbian Exchange sheds light on the contribution of the forces of cultural evolution to the formation of time preference, as opposed to the sorting of high long-term orientation individuals into geographical regions characterized by higher agricultural return. While this sorting process would not affect the nature of the results (i.e., variations in the return to agricultural investment across the globe would still be the origin of the contemporary regional distribution of time preference), this natural experiment provides an essential element that permits the separation of the effect of crop yield on the cultural evolution of time preference from the conceivable sorting of high long-term orientation individuals into regions with high yields. Thus, the differential assignment of superior crops to indigenous populations across the globe in the course of the Columbian Exchange mitigates concerns about sorting. In particular, the causal effect of changes in crop yield is unlikely to capture the effect of sorting in the post-1500 era since the analysis accounts for cross-country migrations over this period.

Finally, superior historical crop-yield could have positively affected past economic outcomes, such as population density, urbanization, and income per capita, which may have affected the observed rate of time preference. Hence, accounting for historical population density, urbanization, as well as GDP per capita, permits the analysis to isolate the cultural component of the effect of potential crop yield from the persistence of past economic prosperity.

3.2 Independent Variables: Potential Crop Yield and Growth Cycle

This subsection introduces the novel global measures of historical potential crop yield and growth cycles that are central to the analysis. These measures properly represent potential crop yield across the globe, as captured by calories (per hectare per year), rectifying deficiencies associated with weight-based measures of agricultural yield. The measures hinge on: (i) estimates of potential crop yield and growth cycle under low level of inputs and rain-fed agriculture – cultivation methods that characterized early stages of development, and (ii) agro-climatic conditions that are orthogonal to human intervention. Furthermore, in light of the expansion of crops amenable for cultivation in the course of the Columbian Exchange (Crosby, 1972), these measures account for pre-1500CE crop yield and growth cycles and their changes in the post-1500 period.

The historical measures of crop yield and growth cycles are constructed based on data from the Global Agro-Ecological Zones (GAEZ) project of the Food and Agriculture Organization (FAO). The GAEZ project supplies global estimates of crop yield and crop growth cycle for a variety of crops in grids with cells size of $5' \times 5'$ (i.e., approximately 100 km^2). For each crop, GAEZ provides estimates for crop yield based on three alternative levels of inputs – high, medium, and low - and two possible sources of water supply – rain-fed and irrigation. Additionally, for each input-water source category, it provides two separate estimates for crop yield, based on agro-climatic conditions that are arguably unaffected by human intervention, and agro-ecological constraints that could potentially reflect human intervention. The FAO dataset provides for each cell in the agro-climatic grid the potential yield for each crop (measured in tons, per hectare, per year). These estimates account for the effect of temperature and moisture on the growth of the crop, the impact of pests, diseases and weeds on the yield, as well as climatic related "workability constraints". In addition, each cell provides estimates for the growth cycle for each crop, capturing the days elapsed from the planting to full maturity.



(a) Crop Yield (b) Crop Growth Cycle

Figure 3: Potential Crop Yield and Growth Cycle for pre-1500CE Crops

The measures employed in the analysis are based on the agro-climatic estimates under low level of inputs and rain-fed agriculture. These restrictions remove potential concerns that the level of agricultural inputs, the irrigation method, and soil quality, reflect endogenous choices that could be potentially correlated with time preference.

In order to capture the nutritional differences across crops, and thus to ensure comparability in the measure of crop yield, each crop's yield in the GAEZ data (measured in tons, per hectare, per year) is converted into caloric yield (measured in millions of kilo calories, per hectare, per year). This conversion is based on the caloric content of crops, provided by the United States Department of Agriculture Nutrient Database for Standard Reference.[14]

In light of the expansion in the set of crops that were available for cultivation in each region in the course of the Columbian Exchange, the constructed measures distinguish between the caloric suitability in the pre-1500 period and in the post 1500 period (Figures B.2 and B.3). In particular, the pre-1500 estimates are based on the subset of crops in the GAEZ/FAO data set which were

[14]The analysis is restricted to the subset of crops that are edible by humans and for which an estimate of the crop growth cycle is available.

available for cultivation in different regions of the world before 1500CE, as documented in Table A.2 (Crosby, 1972; Diamond, 1997).[15] In the post 1500CE period, in contrast, all regions could potentially adopt all crops for agricultural production.[16]

Based on these estimates, the analysis assigns to each cell the crop with the highest potential yield among the available crops in the pre- and post-1500CE period.[17] Thus, the research constructs three sets of measures: (i) the yield and growth cycle for the crop that maximizes potential yield before the Columbian Exchange, (ii) the yield and growth cycle for the crop that maximizes potential yield after Columbian Exchange, and (iii) the changes in the yield and growth cycles of the dominating crop in each cell due to the Columbian Exchange.

Using these measures, the research constructs estimates for the average regional crop yield and the average regional crop growth cycle that reflect the average regional levels of these two variables among crops that maximize the caloric yield in each cell. Since a sedentary community is unlikely to exist in a region in which the caloric yield is zero, the analysis focuses on the averages across cells where the maximum potential crop yield is positive.[18]

Figure 3 depicts the distribution of potential crop yield and growth cycle across global $5' \times 5'$ grids for crops available for cultivation in the pre-1500CE period. Each cell in Figure 3(a) depicts the potential yield (measured in millions of kilo calories, per hectare, per year) generated by the crop with the highest potential yield in that cell. Higher crop yields are marked by darker cells, while lower ones by lighter ones. Similarly, Figure 3(b) depicts the potential crop growth cycle for the crop with the highest potential yield in each cell. Longer growth cycles are marked by darker cells and shorter ones by lighter cells.

As is evident from Figure 3, there are large regional and cross country variations in crop yields. The cross country distribution of pre-1500CE potential crop yield ranges between 0.5 and 18 (millions of kilo calories per hectare per year), has a mean of 7.2 and a standard deviation of 3.2. On the other hand, the distribution of pre-1500CE crop growth cycle has a mean of 134 days, a standard deviation of 18 days and ranges between 80 and 199 days. The correlation between crop yield and growth cycle pre-1500CE is 0.4 ($p < 0.01$) and post-1500CE is 0.78 ($p < 0.01$); suggesting that *"Trees that are slow to grow, bear the best fruit"* (Molière).

The use of potential crop yield as a proxy for actual crop yield overcomes possible concerns about reverse causality.[19] Importantly, potential crop yield can serve as a good proxy since it is positively

[15] The presence of Asian varieties of rice (Oryza sativa) in Subsaharan Africa in the pre-1500CE period has been debated. In particular, the assignment of wetland (Oryza japonica) and indica (Oryza indica) rice varieties to Subsaharan Africa prior to 1500CE is debatable. Figures 3 and A.1 are based on the exclusion of Asian crops in Subsaharan Africa in the pre-1500CE period. In contrast, the regression analyses include the Asian crops. Their exclusion magnifies the economic and statistical significance of the effect of crop yield on long-term orientation.

[16] Crosby (1972) argues that indeed many of the crops diffused rapidly between the New and Old Worlds.

[17] Figure A.1 shows for each cell in the world the highest yield producing crop in the pre- and the post-1500CE era. The analysis abstracts from the limited possibility that agro-climatic conditions would permit multi-cropping within a growing season in a given grid cell. As established in Appendix B.1 allowing for multi-cropping would not affect the analysis.

[18] The results are robust to the inclusion of cells with no potential yield (Table B.27).

[19] GAEZ provides data on actual crop yields in the year 2000 for a small subset of crops. Hence, an explicit two-stage least squares or instrumental variable analysis, in which potential crop yield and growth cycles are used as instruments for actual yield and cycles, is not feasible, since it requires unavailable data on actual crop yield and growth cycle in

correlated with actual crop yield at the cell level (Figure A.2). Moreover, as established in Appendix B.10, using the Ethnographic Atlas (Murdock, 1967), potential crop yield is positively correlated with the dependence on agriculture, the intensity of agriculture, and the contribution of agriculture to subsistence across ethnic groups.

3.3 Additional Controls

As suggested in the empirical strategy section, crop yield is correlated with other geographical characteristics that may have affected the evolution of time preference. Hence, the analysis accounts for the potential confounding effects of a range of geographical factors such as absolute latitude, average elevation, terrain roughness, distance to sea or navigable rivers, as well as islands and landlocked regions.[20] Furthermore, the analysis accounts for continental fixed effects, capturing unobserved continent-specific geographical and historical characteristics that may have codetermined the global distribution of time preference.

The empirical analysis considers the confounding effect of the advent of sedentary agriculture, as captured by the years elapsed since the onset of the Neolithic Revolution, on the evolution of the rate of time preference. The onset of agriculture could have generated conflicting effects on the evolution of time preference. The rise of institutionalized statehood in the aftermath of the transition to agriculture was associated with the taxation of crop yield and thus with a reduction in the incentive to invest (Mayshar et al., 2013; Olsson and Paik, 2013). However, the effect of the Neolithic Revolution on technological advancements and investment in agricultural infrastructure (Ashraf and Galor, 2011; Diamond, 1997) may have countered this adverse effect on the net crop yield. Thus, the effect of the agricultural revolution on the rate of time preference appears a priori ambiguous.

Moreover, the effect of crop yield on long-term orientation would be stronger in regions that experienced the transition to agriculture earlier, provided this evolutionary process had not matured. However, since all countries in the sample experienced the Neolithic Revolution at least 400 years ago, and the vast majority more than 3000 thousand years ago, it is very likely that this culturally driven evolutionary process has matured and its interaction with the years elapsed since the Neolithic Revolution has an insignificant effect on time preference.

4 Crop Yield and Long-Term Orientation (Cross-Country Analysis)

4.1 Baseline Analysis

This section analyzes the empirical relation between crop yield, crop growth cycle, and long-term orientation across countries. In particular, it examines the effect of crop yield on the cultural dimension identified by Hofstede (1991) as Long-Term Orientation (LTO). Hofstede et al. (2010) define Long-Term Orientation as the cultural value that stands for the fostering of virtues oriented toward

the pre-1500 period.

[20]The summary statistics and description of all variables used in the analysis is provided in Appendix C.

future rewards, perseverance and thrift.[21] For the sample of countries used in this research, there exists a positive relation between this measure of Long-Term Orientation and income per capita, education, and economic growth (Figure A.3).

In order to explore the effect of crop yield and growth cycle on Long-Term Orientation, the following empirical specification is estimated via ordinary least squares (OLS):

$$LTO_i = \beta_0 + \beta_1 \text{yield}_i + \beta_2 \text{growth cycle}_i + \sum_j \gamma_{0j} X_{ij} + \gamma_1 \text{YST}_i + \sum_c \gamma_c \delta_c + \epsilon_i, \qquad (16)$$

where LTO_i is the level of Long-Term Orientation in country i as identified by Hofstede et al. (2010), crop yield and crop growth cycle of country i are the post-1500CE measures constructed in the previous section, X_{ij} is geographical characteristic j of country i, YST_i is the number the years elapsed since country i transitioned to agriculture, $\{\delta_c\}$ is a complete set of continental fixed effects, and ϵ_i is the error term of country i. The theory suggests that $\beta_1 > 0$.

The effect of potential crop yield and growth cycle on Long-Term Orientation based on the full set of available crops in the contemporary era are shown in Table 1. Column (1) establishes the relationship between crop yield and Long-Term Orientation, accounting for continental fixed effects and therefore for unobserved time-invariant omitted variables at the continental level. The estimated coefficient is positive and statistically significant at the 1% level. In particular, an increase of one standard deviation in crop yield increases Long-Term Orientation by 0.3 standard deviations (i.e., 7.4 percentage points).

Column (2) accounts for other confounding geographical characteristics of the country such as absolute latitude, mean elevation above sea level, terrain roughness, mean distance to the sea or a navigable river, and dummies for being landlocked or an island. Accounting for the effects of geography and unobserved continental heterogeneity, a one standard deviation increase in crop yield increases Long-Term Orientation by 9.8 percentage points or equivalently 0.4 standard deviations. This is the largest association of any of the variables included in the analysis. Moreover, most geographical characteristics have no significant association with Long-Term Orientation.

Column (3) considers the confounding effect of the advent of sedentary agriculture, as captured by the years elapsed since the onset of the Neolithic Revolution, on the evolution of the rate of time preference. Reassuringly, the coefficient on crop yield remains stable and statistically significant at the 1% level and implies that a one standard deviation increase in crop yield increases Long-Term Orientation by 9.1 percentage points. The estimated coefficients of other geographical characteristics remain smaller than the effect of crop yield. Additionally, the effect of the years elapsed since the onset of the Neolithic Revolution is negative and statistically significant at the 5% level. In particular, a one standard deviation increase in the number of years since the onset of the Neolithic Revolution (approximately 2350 years) is associated with a decrease of 6.5 percentage points in Long-Term

[21] Hofstede (1991) based his original analysis on data gathered from interviews of IBM employees across the world. This original data was later expanded using the data from the Chinese Values Survey and from the World Values Survey. The Long-Term Orientation (LTO) measure varies between 0 (short-term orientation) and 100 (long-term orientation). This measure is positively correlated with the importance ascribed to future profits, savings rates, investment in real estate, and math and science scores (Hofstede et al., 2010).

Orientation.

Table 1: Crop Yield, Growth Cycle, and Long-Term Orientation

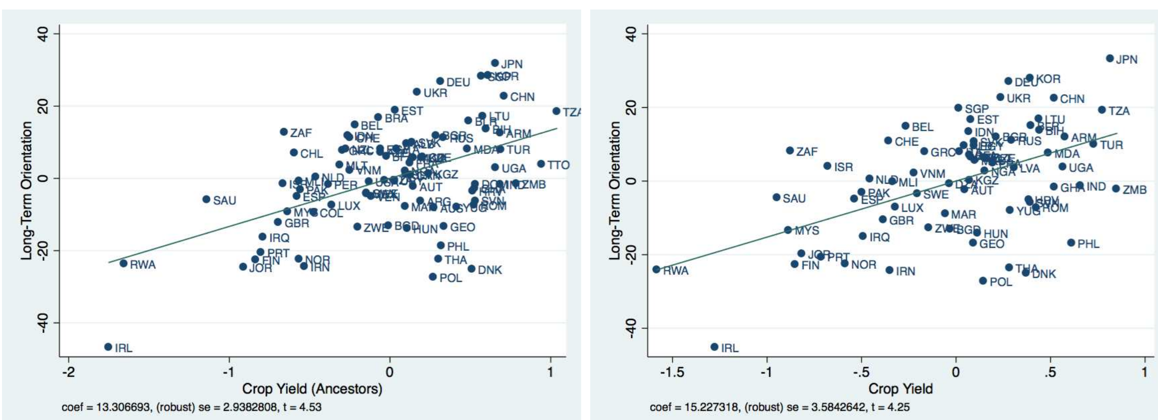
	Long-Term Orientation							
	Whole World						Old World	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield	7.43***	9.84***	9.06***	9.46***		-7.07	13.26***	15.23***
	(2.48)	(2.88)	(2.62)	(3.41)		(6.41)	(2.55)	(3.58)
Crop Growth Cycle				-0.70		10.47		-3.18
				(3.96)		(10.99)		(4.03)
Crop Yield (Ancestors)					13.31***	19.55***		
					(2.94)	(6.69)		
Crop Growth Cycle (Ancestors)					-3.15	-13.41		
					(3.52)	(11.26)		
Absolute Latitude		2.85	1.88	1.68	3.99	4.72	4.76	3.87
		(4.05)	(3.85)	(4.33)	(3.63)	(3.88)	(4.15)	(4.71)
Mean Elevation		4.98*	5.97**	6.09**	5.96**	5.47**	4.58	4.87
		(2.87)	(2.96)	(3.03)	(2.46)	(2.54)	(2.99)	(3.03)
Terrain Roughness		-6.24**	-5.72**	-5.72**	-6.72***	-6.56**	-6.40**	-6.29**
		(2.51)	(2.75)	(2.75)	(2.49)	(2.54)	(2.83)	(2.82)
Neolithic Transition Timing			-6.46**	-6.31**		-3.24	-4.75*	-4.08
			(2.87)	(3.06)		(7.22)	(2.60)	(2.66)
Neolithic Transition Timing (Ancestors)					-4.31*	-1.70		
					(2.30)	(6.24)		
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Geographical Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Old World Sample	No	No	No	No	No	No	Yes	Yes
Adjusted-R^2	0.54	0.60	0.62	0.61	0.66	0.65	0.61	0.61
Observations	87	87	87	87	87	87	72	72

Notes: The table establishes the positive, statistically, and economically significant effect of a country's potential crop yield, measured in calories per hectare per year, on its level of Long-Term Orientation measured on a scale of 0 to 100, accounting for continental fixed effects and other geographical characteristics. Additional geographical controls include distance to coast or river, and landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Column (4) accounts for the effect of crop growth cycle on Long-Term Orientation. As suggested by the theory the coefficient on crop yield remains positive and statistically significant at the 1% level, while the coefficient on crop growth cycle is negative, though not statistically different from zero. The estimated coefficient on crop yield remains stable implying that a one standard deviation increase on crop yield increases Long-Term Orientation by 9.5 percentage points.

The proposed hypothesis suggests that the evolution of time preference reflected the exposure of the ancestral population of contemporary societies to higher crop yield. However, migration of individuals in the post-1500 period could generate a mismatch between the crop yield in the country of residence and the crop yield to which the ancestral populations were exposed. Thus, in order to analyze the effect that migration might have had on the estimated effect, column (5) adjusts crop yield, growth cycle, and timing of transition to agriculture to account for the ancestral composition of the contemporary populations (Putterman and Weil, 2010). These ancestry adjusted measures capture the geographical attributes that existed in the homelands of the ancestral populations of each contemporary country. In particular, for each country the adjusted crop yield is the weighted average of crop yield in the countries where the ancestral populations resided. This adjustment permits the analysis to capture the culturally embodied transmission rather than the direct effect of geography.

As established in column (5), the estimated effect of crop yield is 50% larger, reinforcing the notion that the effect of these geographical attributes is culturally embodied. Moreover, as reported in column (6), in a horse race between the ancestry adjusted and unadjusted measures of crop yield and crop growth cycle, only the adjusted measure of crop yield remains economically and statistically significant, reinforcing the hypothesis about the culturally embodied transmission. The estimates in column (5) imply that accounting for continental fixed effects, other geographical characteristics, the ancestry adjusted timing of transition to the Neolithic Revolution, and the ancestry adjusted crop growth cycle, a one standard deviation increase in the crop yield experienced by the ancestral populations of contemporary countries increases current levels of Long-Term Orientation by 0.53 standard deviations (i.e., 13.3 percentage points). Figure 4(a) depicts the partial correlation plot for the specification in column (5).



(a) Whole World (Ancestry Adjusted)

(b) Old World

Note: This figure illustrates the positive effect of potential crop yield on Long-Term Orientation in the whole world (panel a) and the Old World (panel b). The depicted relationships account for the full set of controls in Table 1.

Figure 4: Potential Crop Yield and Long-Term Orientation

Additionally, columns (7) and (8) establish that the effect of crop yield on Long-Term Orientation is much larger in the Old World, where intercontinental migration and population replacement were less prevalent. One standard deviation increase in crop yield increases Long-Term Orientation by 13.3 and 15.2 percentage points (0.52 and 0.60 standard deviations), respectively. Figure 4(b) depicts the partial correlation between crop yield and Long-Term Orientation for the specification in column (8).

4.2 Natural Experiment: The Columbian Exchange

The natural experiment generated by the Columbian Exchange provides an essential ingredient in overcoming three unsettled issues regarding the observed association between crop yield and Long-Term Orientation: (a) the role of omitted variables at the country level, (b) the comparative role of cultural evolution and the sorting of high long-term orientation individuals into high yield regions, and (c) the historical, as opposed to the contemporary, link between crop yield and long-term orientation.

Table 2: Crop Yield, Growth Cycle, and Long-Term Orientation:
Exploiting the Columbian Exchange

	Long-Term Orientation							
	Whole World						Old World	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield (pre-1500)	5.67**	5.98***	7.28***	8.82***		-3.76	12.23***	15.21***
	(2.40)	(2.09)	(2.29)	(3.13)		(5.41)	(2.84)	(3.51)
Crop Yield Change (post-1500)		7.88**	8.77***	9.83***		2.50	7.95***	10.53***
		(3.08)	(2.69)	(3.11)		(7.00)	(2.56)	(3.30)
Crop Growth Cycle (pre-1500)				-3.77		4.46		-7.65
				(4.17)		(10.20)		(4.80)
Crop Growth Cycle Change (post-1500)				0.16		-8.61		0.31
				(1.90)		(6.85)		(1.73)
Crop Yield (Ancestors, pre-1500)					10.56***	14.05***		
					(2.35)	(5.01)		
Crop Yield Change (Anc., post-1500)					9.86***	8.60		
					(2.28)	(5.68)		
Crop Growth Cycle (Anc., pre-1500)					-7.31**	-12.61		
					(3.59)	(10.09)		
Crop Growth Cycle Ch. (Anc., post-1500)					0.77	8.74		
					(1.60)	(6.08)		
Neolithic Transition Timing			-7.05**	-6.15**		5.84	-5.06*	-3.46
			(2.90)	(2.96)		(7.46)	(2.73)	(2.77)
Neolithic Transition Timing (Anc.)					-4.27*	-8.11		
					(2.23)	(6.14)		
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Old World Sample	No	No	No	No	No	No	Yes	Yes
Adjusted-R^2	0.50	0.55	0.63	0.63	0.68	0.68	0.61	0.62
Observations	87	87	87	87	87	87	72	72

Notes: The table establishes the positive, statistically, and economically significant effect of a country's pre-1500CE potential crop yield and the post-1500CE change in this yield in the course of the Columbian Exchange on the country's level of Long-Term Orientation, accounting for continental fixed effects and other geographical characteristics. Geographical controls include absolute latitude, mean elevation, terrain roughness, distance to coast or river, and landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

In order to explore the effect of crop yield, growth cycle, and their changes on Long-Term Orientation, the following empirical specification is estimated via ordinary least squares (OLS):

$$\begin{aligned} LTO_i = &\beta_0 + \beta_1^{1500}\text{yield}_i + \beta_1^{ch}\Delta\text{yield}_i + \beta_2^{1500}\text{growth cycle}_i + \beta_2^{ch}\Delta\text{cycle}_i \\ &+ \sum_j \gamma_{0j} X_{ij} + \gamma_1 \text{YST}_i + \sum_c \gamma_c \delta_c + \epsilon_i, \end{aligned} \tag{17}$$

where LTO_i is the level of Long-Term Orientation in country i, yield_i and growth cycle_i are the pre-1500CE levels of these measures, Δyield_i and Δcycle_i are their post-1500 changes generated in the course of the Columbian Exchange, X_{ij} is geographical characteristic j of country i, YST_i is the number of years elapsed since country i transitioned to agriculture, $\{\delta_c\}$ is a complete set of continental fixed effects, and ϵ_i is the error term of country i. The theory suggests that $\beta_1^{1500} > 0$ and $\beta_1^{ch} > 0$.

Table 2 examines the effect of pre-1500CE crop yield and growth cycle and their changes in the course of the Columbian Exchange on Long-Term Orientation. Accounting for continental fixed effects column (1) establishes that a one standard deviation increase in the pre-1500CE crop yield generates a 5.7 percentage points increase in Long-Term Orientation. Column (2) shows that the expansion of crops available for cultivation in the post-1500CE period generates an additional increase in Long-Term Orientation. In particular, a one standard deviation increase in pre-1500 crop yield increases Long-Term Orientation by 6 percentage points, while the change in crop yield increases it by 7.9 percentage points. Column (3) establishes that accounting for the confounding effects of additional geographical characteristics and the time elapsed since the transition to agriculture increases the estimated effect of pre-1500 crop yield and its change in the post-1500CE period. Column (4) accounts for the effect of pre-1500CE growth cycle and its change in the course of the Columbian Exchange. Reassuringly, the effect of pre-1500CE crop yield and its change are higher than before and remain statistically and economically significant. Column (5) accounts for migration and population replacement adjusting for the ancestral composition of contemporary populations. The estimated effect of pre-1500CE crop yield increases by 25% , reinforcing the notion that the effect of these geographical attributes is culturally embodied. Moreover, as reported in column (6), in a horse race between the ancestry adjusted and unadjusted measures of crop yield and crop growth cycle and their changes, only the adjusted level of pre-1500 crop yield remains economically and statistically significant, reinforcing the hypothesis that the effect of crop yield on Long-Term Orientation operated through cultural transmission. Columns (7) and (8) establish that the effect of crop yield on Long-Term Orientation is much larger in the Old World, where intercontinental migration and population replacement were less prevalent. In particular, mitigating the effect of measurement errors, the estimated effects in column (8) are larger, implying that a one standard deviation increase in pre-1500CE crop yield increases Long-Term Orientation by 15.2 percentage points, while a one standard deviation increase in the change in yield in the course of the Columbian Exchange increases Long-Term Orientation by 10.5 percentage points.

4.2.1 Mitigating Concerns about Omitted Variables

The natural experiment associated with the Columbian Exchange, and the differential assignment of superior crops to different regions of the world, mitigates potential concerns about omitted variables. In particular, this natural experiment is based on the identifying assumption that, conditional on the pre-1500 distribution of potential crop yield and growth cycle, the change in the potential crop yield and growth cycle resulting from the introduction of new crops is distributed randomly, independently of any other attributes of the grid. More formally, the identifying assumption is that the changes in crop yield and growth cycle, conditional on their pre-1500 levels, are orthogonal to the error term ϵ_i in equation (17). Appendix B.2 provides supportive evidence for the plausibility of this assumption.

Moreover, using statistics on the selection on observables and unobservables (Altonji et al., 2005; Bellows and Miguel, 2009; Oster, 2014), Tables B.8 and B.14 establish that the degree of omitted variable bias is very low and is unlikely to explain the size of the estimated effect of crop yield and its change. In particular, omitted factors would need to be 3-6 times more strongly correlated with the change in crop yield than all the controls accounted for in order to explain the estimated effect of the change in crop yield on Long-Term Orientation. Similarly, omitted factors would need to be at least 50 percent more strongly negatively correlated with pre-1500 yield in order to explain the size of the coefficient, suggesting that the estimated coefficient should be considered a lower bound of the true effect. Indeed, in all specifications, the bias-adjusted estimated effect of pre-1500 crop yield is strictly positive and larger than the OLS estimate (Oster, 2014).

4.2.2 Sorting vs. Cultural Evolution

This subsection examines the relative contributions of cultural evolution and sorting to the observed relation between crop yield, growth cycle and Long-Term Orientation. The theory highlights the effect of crop yield on the gradual propagation of traits for higher long-term orientation due to the forces of natural selection and cultural evolution. A-priori, however, the positive association between higher crop yield and Long-Term Orientation could have been partly generated by the sorting of high long-term individuals into high yield regions. While the existence of this sorting process would not affect the nature of the results (i.e., variations in the return to agricultural investment across the globe would still be the origin of the spatial differences in time preference), it would affect the interpretation of the results, regarding the comparative role of cultural evolution in this association.

The natural experiment associated with the Columbian Exchange provides the necessary ingredients to assess the relative contributions of the forces of cultural evolution and sorting in the post-1500 era. While sorting could have been an important force in the pre-1500 period, and in particular during the demic diffusion of the Neolithic Revolution across the globe, the results in Tables 2 and B.11 suggest that it is an insignificant force in the post-1500 period. Moreover, as suggested in the theory, if during the thousands of years elapsed since the onset of the Neolithic Revolution (and prior to the Columbian Exchange), the composition of time preference in each region had plausibly reached the proximity of its long-run steady-state equilibrium (and is thus independent of the initial composition of time preference in the region), then sorting and its effect on the initial distribution of time preference would have had a negligible effect on Long-Term Orientation in the pre-1500 period and the relationship between Long-Term Orientation and crop yield, even in the pre-1500 era, would reflect primarily the forces of either cultural or genetic evolution.

This research employs two strategies to establish the importance of cultural evolution relative to sorting in the determination of Long-Term Orientation in the post-1500 period. First, restricting the analysis to countries that were not subjected to large inflows of migrants in the post-1500 period, but nevertheless experienced a change in their crop yield and growth cycle, the research isolates the effects of cultural evolution on Long-Term Orientation from the potential effect of sorting.[22] In particular, restricting the analysis to the Old World sample, as established in columns (7) and (8) of Table 2, changes in crop yield in the post-1500 period have a positive and significant effect on Long-Term Orientation. Additionally, for a sample of countries where at least 90 percent of the population descends from individuals that were native to the location in 1500, the positive effect of changes in crop yield in the post-1500 period on Long-Term Orientation is even larger (Table B.11). These results suggest that cultural evolution is a significant force in the determination of Long-Term Orientation during the post-1500 period.

Second, comparing the whole world sample, where migration is prevalent, to the previous subsamples, in which migration is low, facilitates the analysis of the potential contribution of sorting to Long-Term Orientation. In particular, if sorting had taken place, high long-term orientation individuals would have migrated to locations with higher yields, and thus, one would observe a stronger association between changes in the crop yield and Long-Term Orientation in the whole world sample than the one observed in the subsamples with low migration. But, as established in columns (4) and (5) of Table 2, the estimated effect of changes in crop yield in the whole world sample is smaller than the estimated effect in the Old World sample as well as in the native sample, even after adjusting for the ancestral composition of contemporary populations. This suggests that sorting played an insignificant role in the determination of Long-Term Orientation in the whole world sample during the post-1500 era.

4.2.3 Accounting for the Persistence of Historical Geographical Attributes

This subsection examines the relative contributions of cultural evolution and the persistence of geographical characteristics in the formation of Long-Term Orientation. The natural experiment associated with the Columbian Exchange provides the necessary ingredients to assess the relative contribution of historical geographical characteristics to the formation of Long-Term Orientation, as opposed to a potential contemporary association between geographical attributes, development outcomes and the rate of time preference.

[22]While 350-500 years (i.e., 18-25 generations), which is the time elapsed in different regions of the world from 1500 until the decline in the significance of the agricultural sector, is perhaps a short (but not implausible) period for genetic changes in the composition of traits, it is a sufficient time period for cultural evolution of traits, reflecting the process of learning to delay gratification as well as the vertical and horizontal transmission of long-term orientation. In particular, a wide body of evidence about the convergence of cultural traits among immigrants suggests that changes and convergence in cultural traits can occur within few generations, indicating that in the presence of proper economic incentives changes in cultural traits can occur rather rapidly.

Focusing on crops that were available for cultivation in pre-1500CE era permits the identification of the historical nature of the effect. Indeed, as established in Table 2, crop yield in the pre-1500 era has a significant effect on the contemporary level of long-term orientation. Moreover, the effect of historical yields remains in effect even after accounting for migration, suggesting again that this trait is culturally embodied. Furthermore, constraining the analysis to cells in which the dominating crop had changed in the post-1500CE period, and thus abstracting from cells in which the dominating contemporary crops are indistinguishable from the historical ones, does not qualitatively alter the results (Appendix B.2).

4.3 Robustness

4.3.1 Persistence of Development

This subsection establishes that the effect of crop yield on Long-Term Orientation is unaffected by the plausible effect of agricultural productivity on pre-industrial population density, urbanization, and GDP per capita, and their conceivable persistent effect on contemporary development (Ashraf and Galor, 2011; Nunn and Qian, 2011). In particular, accounting for historical population density as well as urbanization and GDP per capita permits the analysis to isolate the cultural component of the effect of potential crop yield, from the persistent consequences of past economic prosperity.

Table 3 establishes that accounting for historical levels of population density, urbanization, and GDP per capita, the coefficients on crop yield and its change in the post-1500 period remain stable and statistically and economically significant.[23] Furthermore, the partial and semi-partial R^2 analysis suggest that the explanatory power of crop yield and growth cycle, as well as their changes, is significantly larger than alternative geographical and economic factors.[24]

4.3.2 Alternative Cultural Characteristics

This subsection establishes that the effect of potential crop yield on Long-Term Orientation does not capture its effect on a wide range of other cultural characteristics proposed by Hofstede (1991), such as Uncertainty Avoidance (the level of tolerance and rigidness of society), Power Distance (the level of hierarchy and inequality of power), Individualism (how individualistic as opposed to collectivistic a society is), and Masculinity (level of internal cooperation or competition).[25] In particular, as

[23] A potential concern is the presence of measurement errors in the added historical controls, which might underestimate their contribution to long-term orientation. However, these historical controls (with the exception of population density in 1500) are (unconditionally) uncorrelated with Long-Term Orientation and their inclusion does not alter the quantitative results. Moreover, as shown in Appendices B.2 and B.4, the return to agricultural investment rather than aggregate agricultural productivity per se matters for Long-Term Orientation.

[24] The partial and semi-partial R^2 analysis assesses the importance of the various independent variables in the determination of the dependent variable. In particular, the partial R^2 of an independent variable x measures the fraction of the *residual* variation in the dependent variable, y (after partialling out the contribution of all other independent variables to y), that is explained by x (after partialling out the contribution of all other independent variables to x). On the other hand, the semi-partial R^2 of an independent variable x measures the fraction of the *total* variation in the dependent variable, y, that is explained by x (after partialling out the contribution of all other independent variables to x). See Cohen and Cohen (2003).

[25] As established in Table B.24, Long-Term Orientation is uncorrelated with Hofstede's measures of culture, except for Restraint vs. Indulgence, which as discussed in Appendix B.8 is an inferior measure of time preference in comparison

Table 3: Crop Yield, Growth Cycle, and Long-Term Orientation:
Accounting for the Persistence of Development

	Long-Term Orientation							
	Population Density		Urbanization				GDP per capita	
	1500CE		1500CE		1800CE		1870CE	1913CE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield (Ancestors, pre-1500)	11.05***	11.52***	10.01***	11.08***	11.54***	11.54***	14.19***	12.66**
	(2.53)	(2.33)	(3.68)	(3.68)	(3.18)	(3.22)	(5.08)	(5.02)
Crop Yield Change (post-1500)	10.76***	10.40***	8.77**	9.96***	10.05***	10.22***	15.55***	14.92***
	(2.89)	(2.78)	(3.35)	(3.35)	(3.23)	(3.37)	(3.22)	(3.29)
Crop Growth Cycle (Anc., pre-1500)	-8.06*	-10.43***	-5.06	-7.30	-8.60*	-8.75*	-12.58*	-10.28
	(4.06)	(3.63)	(5.28)	(5.37)	(4.68)	(4.84)	(6.44)	(6.46)
Crop Growth Cycle Ch. (post-1500)	-0.46	-1.06	1.06	0.55	0.07	0.03	2.14	3.31
	(1.72)	(1.84)	(2.91)	(2.95)	(2.37)	(2.41)	(3.38)	(3.35)
Population density in 1500 CE		3.76**						
		(1.86)						
Urbanization rate in 1500 CE				1.90				
				(2.24)				
Urbanization rate in 1800 CE						-0.57		
						(1.22)		
GDP per capita 1870							10.57***	
							(3.65)	
GDP per capita 1913								10.99***
								(3.53)
	Partial R^2							
Crop Yield (Anc., pre-1500)	0.23***	0.25***	0.11***	0.12***	0.20***	0.20***	0.25***	0.21**
Crop Yield Change (post-1500)	0.16***	0.16***	0.08**	0.09***	0.12***	0.12***	0.27***	0.26***
Crop Growth Cycle (Anc., pre-1500)	0.06*	0.09***	0.02	0.03	0.06*	0.06*	0.12*	0.09
Crop Growth Cycle Ch. (post-1500)	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02
Population density in 1500 CE		0.05**						
Urbanization rate in 1500 CE				0.01				
Urbanization rate in 1800 CE						0.00		
GDPpc 1870							0.16***	
GDPpc 1913								0.17***
	Semi-Partial R^2							
Crop Yield (Anc., pre-1500)	0.08***	0.09***	0.04***	0.04***	0.07***	0.07***	0.09***	0.07**
Crop Yield Change (post-1500)	0.05***	0.05***	0.03**	0.03***	0.04***	0.04***	0.10***	0.09***
Crop Growth Cycle (Anc., pre-1500)	0.02*	0.03***	0.00	0.01	0.02*	0.02*	0.04*	0.03
Crop Growth Cycle Ch. (post-1500)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Population density in 1500 CE		0.01**						
Urbanization rate in 1500 CE				0.00				
Urbanization rate in 1800 CE						0.00		
GDPpc 1870							0.05***	
GDPpc 1913								0.05***
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.65	0.67	0.60	0.60	0.63	0.62	0.59	0.59
Observations	87	87	65	65	79	79	50	50

Notes: The table establishes the positive, statistically, and economically significant effect of a country's pre-1500CE potential crop yield, growth cycle and their post-1500CE changes in these values in the course of the Columbian Exchange on the country's level of Long-Term Orientation, accounting for continental fixed effects, other geographical characteristics, and pre-industrial development (population density, urbanization rates, and GDP per capita). All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

demonstrated in Table 4, pre-1500CE crop yield and its change do not affect this range of cultural characteristics, while accounting for their potential confounding effects does not alter the effect of pre-1500CE crop yield and its change on Long-Term Orientation.[26] Furthermore, while crop yield has a marginally significant negative effect on Generalized Trust (Table 4) accounting for Trust does not alter the effect of crop yield on Long-Term Orientation.

Table 4: Crop Yield, Growth Cycle, and Other (Cultural) Traits

	Cultural Indices					
	Long-Term Orientation	Trust	Individualism	Power Distance	Cooperation	Uncertainty Avoidance
	(1)	(2)	(3)	(4)	(5)	(6)
Crop Yield (Ancestors, pre-1500)	9.43***	-7.76*	-11.85	5.76	-8.11	3.70
	(3.46)	(4.01)	(7.15)	(6.62)	(6.58)	(6.42)
Crop Yield Change (Anc., post-1500)	8.15***	-0.62	-3.12	1.77	-1.48	-0.17
	(2.09)	(3.55)	(2.85)	(2.63)	(2.45)	(2.33)
Crop Growth Cycle (Anc., pre-1500)	-6.60*	0.64	3.27	-1.54	4.79	5.04
	(3.82)	(4.95)	(5.64)	(6.57)	(6.73)	(6.43)
Crop Growth Cycle Change (Anc., post-1500)	-1.07	1.94	-3.70	-0.69	2.99	-0.11
	(1.76)	(2.11)	(3.18)	(3.02)	(2.53)	(3.32)
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes
All Geographical Controls	Yes	Yes	Yes	Yes	Yes	Yes
Agr. Suitability & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.70	0.45	0.67	0.38	0.44	0.59
Observations	85	83	60	60	60	60

Notes: The table analyzes the relation between various societal preferences and cultural indices and pre-1500CE potential crop yield, growth cycle, and their changes in the post-1500CE period as experienced by the country's ancestral populations. All columns account for continental fixed effects, geographical controls, and the land suitability and the timing of transition to agriculture experienced by the ancestral populations of the country. Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, landlocked and island dummies, precipitation, temperature, and shares of land in tropical, subtropical and in temperate climate zones. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

4.3.3 Risk, Trade and Other Potential Channels

The effect of crop yield on Long-Term Orientation is robust to a large set of alternative theories and confounding factors as reported in Appendix B. First, accounting for proxies of the extent of trade has no qualitative effect on the analysis. In particular, as established in Tables B.17 and B.18, controlling for the existence of pre-industrial medium of exchange, transportation technologies, trade routes, extent of trade and area of a country does not alter the effect of crop yield on Long-Term Orientation.

Second, accounting for the climatic risk associated with agricultural investment has no bearing on the result. While climatic volatility may adversely affect the effective return to agricultural

to Long-Term Orientation.

[26]The analysis accounts for an expanded set of geographical controls in order to capture other proposed determinants of these cultural traits (e.g., agricultural suitability and its negative association with trust (Litina, 2016)).

investment, accounting for volatility in precipitation and temperature, as well as for potential of spatial risk diversification, does not alter the results qualitatively (Table B.18), suggesting that the measure of potential caloric yield may account for these factors. Furthermore, as established in Table 4, crop yield and growth cycle do not affect Uncertainty Avoidance while Uncertainty Avoidance does not alter the effect of crop yield and growth cycle on Long-Term Orientation, suggesting that while crop yield has generated an evolutionary process in long term orientation it has not triggered a corresponding process in the evolution of risk aversion.

Third, a large number of additional pre-industrial and contemporary confounding factors that might be correlated with Long-Term Orientation, crop yield, and growth cycles do not have a qualitative effect on the analysis. In particular, as established in Tables B.16, B.18, B.19 and B.20, accounting for the structure of languages (Chen, 2013), the availability of the plough (Alesina et al., 2013), income inequality, the population's age structure, life-expectancy, and religious composition, does not alter the results. Moreover, the the analysis is robust to the correction of standard errors for spatial autocorrelation (Tables B.13 and B.14).

5 Crop Yield and Long-Term Oriented Behavior (2nd-Generation Migrants)

This section analyzes the effect of pre-1500CE crop yield, growth cycle, and their changes in the course of the Columbian Exchange on Long-Term Orientation and long-term oriented behavior of second-generation migrants in Europe and the United States.[27] In particular, it analyses the effect of crop yield on Long-Term Orientation and Saving Behavior as reported in the European Social Survey (ESS),[28] and on smoking behavior as reported in the General Social Survey (GSS).

The analysis of second-generation migrants accounts for time invariant unobserved heterogeneity in the host country (e.g., geographical, cultural and institutional characteristics), mitigating possible concerns about the confounding effect of host country-specific characteristics. Moreover, since crop yield in the parental country of origin is distinct from the crop yield in the country of residence, the estimated effect of crop yield in the country of origin captures the culturally embodied, intergenerationally transmitted effect of crop yield on long-term orientation, rather than the direct effect of geography.

[27]The sample of second-generation migrants is composed of all respondents who were born in the country where the interview was conducted, and at least one of their parents was not born in that country. The inclusion of individuals with at least one foreign born parent (rather than individuals whose parents are both foreign born), might lower the estimated effect of the culturally embodied and intergenerationally transmitted effect of crop yield, but increases the sample size nearly fivefold. As established below and in Appendix B.11, the results are robust to constraining the sample to individuals whose parents are both foreign born (either in the same or different country).

[28]The measure of Long-Term Orientation used in this section is based on the answer to the question "Do you generally plan for your future or do you just take each day as it comes?". The original answers were renormalized so that Long-Term Orientation is measured between 0 (short term-orientation) and 100 (Long-Term Orientation). Reassuringly, this measure of long-term orientation and the respondent's completed number of years of schooling and total household income are strongly positively correlated (Tables B.32 and B.33). Saving Behavior is based on the answer to the question "Please think about all types of savings such as bank accounts, investments, private and company pensions as well as property. Are you currently saving or have you saved in the past specifically in order to live comfortably in your old age?". Original answers have been recoded so that "Yes=1" and "No=0".

5.1 Crop Yield and Long-Term Orientation

This subsection analyzes the effect of pre-1500CE crop yield, growth cycle, and their changes in the course of the Columbian Exchange on the Long-Term Orientation of second-generation migrants in Europe. The effect of potential crop yield on Long-Term Orientation is estimated via ordinary least squares (OLS).

$$\begin{aligned} LTO_{ic} = & \beta_0 + \beta_1^{1500}\text{yield}_{icp} + \beta_1^{ch}\Delta\text{yield}_{icp} + \beta_2^{1500}\text{growth cycle}_{icp} + \beta_2^{ch}\Delta\text{cycle}_{icp} \\ & + \sum_j \gamma_{0j} X_{icpj} + \gamma_1 \text{YST}_{icp} + \sum_j \gamma_{2j} Y_{icj} + \sum_c \gamma_c \delta_{ic} + \epsilon_{ic}, \end{aligned} \tag{18}$$

where LTO_{ic} is the Long-Term Orientation of second-generation migrant i in country c, yield$_{icp}$, Δyield$_{icp}$, growth cycle$_{icp}$ and Δcycle$_{icp}$ are measured in the country of origin of parent p of individual i in country c, X_{icpj} is geographical characteristic j of the country of origin of parent p of individual i in country c, YST$_{icp}$ is the number of years since the country of origin of parent p of individual i in country c transitioned to agriculture, Y_{icj} is characteristic j of individual i in country c (sex, age, education, marital status, health status, religiosity),[29] δ_{ic} is the country of birth fixed effect of individual i, and ϵ_{ic} is the error term. The theory predicts a positive effect of pre-1500 crop yield and its change on Long-Term Orientation (i.e. $\beta_1^{1500} > 0$ and $\beta_1^{ch} > 0$).

Table 5: Crop Yield, Growth Cycle, and Long-Term Orientation of Second-Generation Migrants

	Long-Term Orientation							
	Either Parent		Mother		Father		Both	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield (Ancestors, pre-1500)	2.34***	2.66***	3.25***	3.62***	2.48**	3.13***	5.12**	5.72**
	(0.79)	(0.96)	(1.10)	(1.30)	(1.00)	(1.12)	(2.42)	(2.48)
Crop Yield Change (post-1500)	0.55	0.70	0.47	1.06	0.53	0.41	1.78	2.07
	(0.63)	(0.57)	(0.75)	(0.82)	(0.91)	(0.99)	(1.32)	(1.74)
Crop Growth Cycle (Ancestors, pre-1500)		-0.82		-1.08		-1.81		-2.29
		(0.98)		(1.56)		(1.42)		(2.78)
Crop Growth Cycle Change (post-1500)		-0.15		-1.11*		0.61		0.02
		(0.60)		(0.65)		(0.81)		(1.31)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All Geographical Controls & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.06	0.06	0.05	0.05	0.06	0.06	0.04	0.04
Observations	2584	2584	1596	1596	1686	1686	568	568

Notes: The table establishes that second generation migrant's Long-Term Orientation is positively affected by pre-1500CE crop yield in the parental country of origin. All columns account for country of birth fixed effects, individual characteristics (age, gender, education, religiosity, health status) and geographical controls from the parental country of origin (absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, landlocked and island dummies). All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable. Heteroskedasticity robust standard error estimates clustered at the parental country of origin level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table 5 establishes the positive statistically and economically significant effect of crop yield on

[29] The inclusion of individuals' incomes does not alter the results but reduces the sample size by nearly 50%.

Long-Term Orientation. The estimated effect implies that increasing pre-1500CE crop yield in the parental country of origin by one standard deviation increases Long-Term Orientation of second-generation migrants by 2-6 percentage points. This result accounts for country of birth fixed effects, individual characteristics, and other geographical characteristics of the parental country of origin. Moreover, focusing on individuals who have at least one foreign-born parent (columns 1 and 2), foreign-born mother (columns 3 and 4) or foreign-born father (columns 5 and 6), or whose mother *and* father were born in the same foreign country, does not alter the results. Furthermore, the results are robust to the estimation method (i.e., OLS vs. ordered probit), a wide range of controls, and various weighting schemes (Appendix B.11).

Table 6: Crop Yield, Growth Cycle, and Saving of Second-Generation Migrants

	Saving							
	Either Parent		Mother		Father		Both	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield (Ancestors, pre-1500)	0.06*	0.02	0.05*	0.02	0.08**	0.03	0.06	0.02
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.05)	(0.06)
Crop Yield Change (post-1500)	0.03**	0.03*	0.03*	0.02*	0.05***	0.04**	0.10***	0.08**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.03)	(0.03)
Crop Growth Cycle (Ancestors, pre-1500)	-0.06*	-0.02	-0.05	-0.01	-0.08**	-0.03	-0.12*	-0.05
	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)	(0.06)	(0.06)
Crop Growth Cycle Change (post-1500)	-0.02	-0.02	-0.01	-0.01	-0.03	-0.03*	-0.02	-0.02
	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.03)	(0.02)
Long-Term Orientation		0.07***		0.06***		0.08***		0.09**
		(0.02)		(0.02)		(0.02)		(0.04)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.15	0.16	0.15	0.15	0.15	0.16	0.16	0.16
Observations	2334	2334	1435	1435	1503	1503	509	509

Notes: The table establishes that second generation migrant's saving behavior is positively affected by pre-1500CE crop yield in the parental country of origin. Moreover, it suggests that the effect of crop yield on saving behavior is mediated by long-term orientation. All columns account for country of birth fixed effects, individual characteristics (age, gender) and geographical controls from the parental country of origin (absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, landlocked and island dummies). All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable. Heteroskedasticity robust standard error estimates clustered at the country of origin of parents level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

5.2 Crop Yield, Growth Cycle, Saving and Smoking

This subsection examines the effect of pre-1500 potential crop yield, growth cycle, and their changes on saving and smoking behavior of second-generation migrants, in light of the conjectured positive association between long-term orientation and saving, and the negative association between long-term orientation and smoking.[30]

[30]Similarly, one could conjecture a positive association between long-term orientation and education. As reported in Table B.36, there exists a positive statistically and economically significant effect of pre-1500CE crop yield on tertiary education, however, in light of the significant measurement errors in the education measures provided by the ESS, the

Table 6 establishes a positive effect of pre-1500CE crop yield and its change in the course of the Columbian Exchange on saving behavior of second-generation migrants. In particular, the estimated OLS effect suggests that a one standard deviation increase in pre-1500CE crop yield raises the probability of saving by 2-8 percentage points. Similarly, a one standard deviation increase in the change in crop yield in the post-1500CE period raises the probability of saving by 2-10 percentage points. Moreover, it establishes that the effect of crop yield on saving behavior is mediated by long-term orientation. In particular, the highly significant positive effect of crop yield in the pre-1500CE era on contemporary saving dissipates once one accounts for Long-Term Orientation and the effect of the change in crop yield in the post-1500CE is weakened.

Table 7 establishes a negative effect of pre-1500CE crop yield and its change on smoking behavior of second-generation migrants in the US. In particular, it establishes that the probability of being a habitual smoker would have been 4 percentage points lower if pre-1500CE crop yield in the parental country of origin had been one standard deviation higher. Similarly, the probability of having ever smoked decreases by 10-14 percentage points if crop yield in the country of parental origin increased by one standard deviation.[31]

Table 7: Crop Yield, Growth Cycle, and Smoking Behavior of Second-Generation Migrants

	Smoking			
	Either Parent		Both	
	Habit	Ever	Habit	Ever
	(1)	(2)	(3)	(4)
Crop Yield (Ancestors, pre-1500)	-0.04**	-0.10***	-0.04*	-0.14***
	(0.02)	(0.02)	(0.02)	(0.03)
Crop Yield Change (post-1500)	-0.00	0.05	-0.01	-0.02
	(0.02)	(0.03)	(0.02)	(0.02)
Crop Growth Cycle (Ancestors, pre-1500)	0.00	0.05**	0.00	0.13***
	(0.02)	(0.02)	(0.03)	(0.04)
Crop Growth Cycle Change (post-1500)	-0.01	0.00	-0.00	0.05*
	(0.02)	(0.03)	(0.02)	(0.02)
Individual Controls	Yes	Yes	Yes	Yes
Region & Year FE	Yes	Yes	Yes	Yes
Geographical Controls & Neolithic	Yes	Yes	Yes	Yes
Adjusted-R^2	0.07	0.11	0.07	0.16
Observations	1532	915	794	480

Notes: The table establishes that second generation migrant's smoking behavior is negatively affected by pre-1500CE crop yield in the parental country of origin. All columns account for country of birth fixed effects, individual characteristics (age, gender, education, religiosity, health status) and geographical controls from the parental country of origin (absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, landlocked and island dummies). All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable. Heteroskedasticity robust standard error estimates clustered at the country of origin of parents level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Thus, as posited by the theory, individuals whose ancestors experienced higher crop yields have

analysis appears less robust. Indeed, the cross-country analysis in Table B.22 suggests that the effect of pre-1500CE crop yield on education is robust and highly significant.

[31]The role of Long-Term Orientation in mediating the effect of crop yield on smoking is insignificant, possibly due to the sample size.

higher Long-Term Orientation and exhibit more long-term oriented behavior. Moreover, the focus on second generation migrants suggests that the effect of crop yield is culturally embodied and intergenerationally transmitted.

6 Crop Yield and Long-Term Orientation (Across Individuals and Regions)

This section uses the World Values Survey (WVS) to provide additional evidence on the effect of crop yield and crop growth cycle on: (i) individuals' Long-Term Orientation, and (ii) the share of long-term oriented individuals in a region.[32]

6.1 Individual-Level Analysis

The empirical analysis estimates the effect of crop yield and crop growth cycle using both the linear probability and probit models, given the binary nature of the dependent variable in the individual-level analysis. In particular, the empirical specification is:

$$\begin{aligned} LTO_{icw} =& \beta_0 + \beta_1^{1500}\text{yield}_c + \beta_1^{ch}\Delta\text{yield}_c + \beta_2^{1500}\text{growth cycle}_c + \beta_2^{ch}\Delta\text{cycle}_c \\ &+ \sum_j \gamma_{0j} X_{cj} + \gamma_1 \text{YST}_c + \sum_j \gamma_{2j} Y_{icwj} + \sum_{cw} \gamma_{cw}\delta_{cw} + \epsilon_{icw}, \end{aligned} \tag{19}$$

where $LTO_{icw} \in \{0, 1\}$ denotes the Long-Term Orientation of individual i in country c during wave w of the WVS; yield_c and growth cycle_c are the pre-1500 crop measures in country c; Δyield_c and Δcycle_c are the change in the crop measures in country c caused by the Columbian Exchange; X_{cj} is geographical characteristic j of country c; YST_c is the number of years since country c transitioned to agriculture; Y_{icwj} is characteristic j (sex, age, education, income) of individual i in country c during wave w; $\{\delta_{cw}\}$ is a complete set of continent and wave fixed effects; and ϵ_{icw} is the error term. The theory predicts a positive effect of crop yield and its change on Long-Term Orientation (i.e., $\beta_1^{1500} > 0$ and $\beta_1^{ch} > 0$).

Table 8 establishes the positive statistically and economically significant effect of pre-1500CE crop yield on individuals' Long-Term Orientation. The result is robust to the inclusion of wave and continental fixed effects (column 1), geographical characteristics (column 2), the number of years since transition to agriculture (column 3), and individual's gender, age, income, and education levels (column 4). The estimated effect suggests that a one standard deviation increase in pre-1500CE crop yield increases the probability of having Long-Term Orientation by 3.2 percentage points.

Moreover, the change in crop yield generated by the Columbian Exchange has a positive effect on Long-Term Orientation (column 5). The estimated effect of crop yield and its change on Long-Term Orientation is robust to the inclusion of the crop growth cycle and its change (columns 6). Moreover, accounting for the ancestral composition of the contemporary population (column 7) and constraining the sample to the Old World (column 8) increases the estimated effect of pre-1500CE crop yield: a one

[32]The measure of Long-Term Orientation is based on the following question in the WVS: "Here is a list of qualities that children can be encouraged to learn at home. Which, if any, do you consider to be especially important?" Individuals are considered to have Long-Term Orientation if they answered "Thrift, saving money and things".

Table 8: Crop Yield, Growth Cycle, and Long-Term Orientation:
Country-level Analysis based on WVS

	Long-Term Orientation (OLS)							
	Whole World							Old World
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield (pre-1500)	0.025***	0.040***	0.036***	0.032***	0.032***	0.031***		0.066***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)		(0.003)
Crop Yield Change (post-1500)					0.053***	0.054***		0.055***
					(0.002)	(0.002)		(0.003)
Crop Growth Cycle (pre-1500)						-0.007**		-0.018***
						(0.003)		(0.003)
Crop Growth Cycle Change (post-1500)						0.025***		0.026***
						(0.002)		(0.002)
Crop Yield (Ancestors, pre-1500)							0.043***	
							(0.002)	
Crop Yield Change (Anc., post-1500)							0.041***	
							(0.002)	
Crop Growth Cycle (Ancestors, pre-1500)							-0.005*	
							(0.003)	
Crop Growth Cycle Change (Anc., post-1500)							0.018***	
							(0.002)	
Wave FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls & Neolithic	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	No	No	No	Yes	Yes	Yes	Yes	Yes
Old World Subsample	No	No	No	No	No	No	No	Yes
Adjusted-R^2	0.02	0.02	0.02	0.04	0.04	0.04	0.05	0.05
Observations	217953	217953	217953	217953	217953	217953	217953	176489

Notes: The table establishes the positive, statistically, and economically significant effect of potential crop yield on individual's Long-Term Orientation. All columns include continental and interview-wave fixed effects. Geographical controls are absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, landlocked and island dummies. Individual Characteristics are age, sex, education, and income. Columns (1)-(7) show the results for the whole world sample, while column (8) shows the results for the Old World sample. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates clustered at the region of interview and individual characteristics level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

standard deviation increase in crop yield increases the probability of having Long-Term Orientation by 4.3 and 6.6 percentage points respectively in columns 7 and 8. Additionally, a one standard deviation increase in the post-1500 change in crop yield increases Long-Term Orientation by 4.1 and 5.5 percentage points respectively. The results based on the ancestral composition of the population further suggest that the effect of crop yield is culturally embodied and that the crop yield faced by the ancestral populations played a crucial role in the determination of the contemporary level of Long-Term Orientation.[33]

In light of the limited ability to associate individuals within a country with their regional ancestry, the location of the interview is used as the individual's ancestral region of origin. However, in countries in which cross-regional migration is prevalent, this proxy is inaccurate, and consequently, as reported in Table B.39, the estimated effect of crop yield on Long-Term Orientation is an order of magnitude smaller and somewhat less significant once one accounts for country fixed-effects.

6.2 Regional-Level Analysis

This section analyzes the determinants of the average level of Long-Term Orientation across regions. It establishes the robustness of the results to the inclusion of country fixed-effects once (i) individual responses are aggregated within each region, mitigating the effect of idiosyncratic shocks; (ii) observations are weighted by the scale of each region, mitigating the effect of internal migration on the measurement errors in mapping individuals to their ancestral region of origin; (iii) post-1500 crop yield and growth cycle in each region are used, reducing measurement errors associated with attributing pre-1500 crop yield in the region to the ancestral origins of individuals who are currently residing in the region.

As established in columns (1)-(3) in Table 9 crop yield has a positive statistically and economically significant effect on regional Long-Term Orientation, accounting for continental fixed effects, geographical characteristics, and crop growth cycle. The estimated effect of crop yield implies that a one standard deviation increase in a region's crop yield increases its average Long-Term Orientation by 5.3 percentage points. Column (4) accounts for cross-country migration. Adjusting for the ancestral composition of the population increases the absolute size of the estimated effect. In particular, an increase of one standard deviation in the crop yield experienced by a region's ancestral populations increases its average Long-Term Orientation by 7.7 percentage points.

Columns (5) and (6) weigh regions according to their area in order to account for possible measurement errors caused by internal migration. Indeed, assigning higher weights to regions with larger areas, doubles the coefficient on crop yield and generates a five-fold increase in the coefficient on crop growth cycle. Columns (7) and (8) account for time invariant country level unobservable heterogeneity. While the coefficients fall by more then 50% on both crop yield and crop growth cycle, the effect of both variables remains statistically and economically significant. Columns (9) and (10) weigh regions according to their area's share within the country, and the results are qualitatively unchanged.

[33]Estimating a probit model does not alter the results (Table B.37). Similarly, the results are not affected by the inclusion of only those cells that changed crops in the post-1500CE era, or by various weighting schemes (Appendix B.12).

Table 9: Crop Yield, Growth Cycle, and Long-Term Orientation:
Regional-level Analysis based on WVS

	Share of Individuals in WVS Region with Long-Term Orientation											
	Whole World										Old World	
	Unweighted				Weighted: Area				Weighted: Area Share		Area	Share
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Crop Yield	0.049***	0.046***	0.053***		0.097***		0.032**		0.031**		0.039***	0.032**
	(0.012)	(0.013)	(0.017)		(0.033)		(0.012)		(0.013)		(0.015)	(0.013)
Crop Growth Cycle			-0.010		-0.047**		-0.024**		-0.036***		-0.027***	-0.036***
			(0.012)		(0.021)		(0.010)		(0.009)		(0.009)	(0.008)
Crop Yield (Ancestors)				0.077***		0.133***		0.043**		0.041**		
				(0.020)		(0.032)		(0.017)		(0.017)		
Crop Growth Cycle (Ancestors)				-0.012		-0.050***		-0.027***		-0.037***		
				(0.013)		(0.018)		(0.009)		(0.009)		
Absolute Latitude		-0.015	-0.018	-0.003	-0.017	0.010	-0.047	-0.047	-0.005	-0.006	-0.047	-0.055
		(0.020)	(0.020)	(0.020)	(0.043)	(0.043)	(0.057)	(0.056)	(0.037)	(0.036)	(0.063)	(0.036)
Mean Elevation		-0.012	-0.012	-0.013	-0.002	-0.014	0.014	0.015	-0.007	-0.006	0.019	-0.008
		(0.013)	(0.013)	(0.013)	(0.026)	(0.027)	(0.024)	(0.024)	(0.005)	(0.005)	(0.032)	(0.008)
Terrain Roughness		0.016	0.018*	0.006	0.019	0.010	-0.020	-0.021	0.001	0.000	-0.023	0.006
		(0.010)	(0.011)	(0.011)	(0.023)	(0.025)	(0.031)	(0.031)	(0.010)	(0.010)	(0.039)	(0.015)
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Country FE	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Additional Geographical Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Old World Sample	No	No	No	No	No	No	No	No	No	No	Yes	Yes
Weighted by Region Area	No	No	No	No	Yes	Yes	Yes	Yes	No	No	Yes	No
Weighted by Region's Share of Area	No	No	No	No	No	No	No	No	Yes	Yes	No	Yes
Adjusted-R^2	0.22	0.25	0.25	0.28	0.28	0.37	0.72	0.72	0.86	0.86	0.72	0.86
Observations	1356	1356	1356	1356	1356	1356	1356	1356	1356	1356	1143	1143

Notes: The table establishes the positive, statistically, and economically significant effect of potential crop yield on the share of individual's with Long-Term Orientation across regions, accounting of country fixed effects. Additional geographical controls are percentage of land within 100 km of sea, landlocked dummy, and area suitable for agriculture. Columns (1)-(4) show the unweighted results; columns (5)-(8) weight observations according to the region's area; columns (9)-(10) weight observations according to the region's area as a share of the country's area; and columns (11)-(12) conduct the analysis for the Old World Sample. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates clustered at the country level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Finally, columns (11) and (12) establish that the results are unaffected by constraining the sample to the Old World.

7 Additional Predictions and Evidence

7.1 Crop Yield, Growth Cycle and Technological Adoption

This subsection explores the reduced form effect of crop yield and growth cycle on technological adoption. In light of the plausible association between long-term orientation and technological adoption, the theory suggests that regions characterized by higher crop yield would be more technologically advanced. Using ethnic level data from the Standard Cross Cultural Sample (Murdock and White, 1969), Table 10 establishes that societies whose ancestral populations were exposed to higher crop yields and shorter growth cycles in the pre-1500 era, and those that were exposed to larger increases in yields and decreases in growth cycles in the post-1500 era, had a higher probability of adopting major technological innovations.[34] Moreover, pre-1500CE crop yield has qualitatively similar effects on the number of technologies adopted by these ethnic groups (Table B.42 and B.43).

Furthermore, some prominent production processes that are notorious for their lengthy production cycles appear to be located in regions that are characterized by high potential caloric yield. In particular, the production of the Modena and Reggio Emilia balsamic Vinegar (cycles of 12 to 25 years) and the Parmigiano-Reggiano cheese (cycles of 12 to 36 months) that were originated in the Middle-Ages are located in the region of Emilia-Romagna, which has the highest crop yield among all Italian regions (Figure B.6).

7.2 Crop Yield, Growth Cycle and Population Density

This subsection examines the conjectured effect of crop yield and growth cycle on reproductive success and thus on population density. In particular, the theory suggests that during the Malthusian era individuals with higher Long-Term Orientation had higher reproductive success. Thus, regions characterized by a larger share of individuals with higher Long-Term Orientation would be expected to have higher population density. Consistent with this prediction, Table B.21 establishes that higher crop yield is associated with higher population density in the year 1500. It should be noted that in the post-demographic transition era when reproductive success is no longer correlated with income, the association between Long-Term Orientation and population density will vanish. Instead, Long-Term Orientation would be expected to be correlated with the education of children rather than their number. Indeed, as established in table B.22 education in the contemporary period is positively correlated with pre-1500CE crop yield.

[34] Asian varieties of crops (i.e., wetland rice, indica rice and greengram) in Subsaharan Africa are excluded from the ethnic group level analysis. As discussed earlier, the presence of these crops in Subsaharan Africa has been debated. If Asian crops are included the effect of the change in crop yield in the post-1500 period is the significant factor in technological adoption (Table B.41).

Table 10: Crop Yield, Growth Cycle, and Technological Adoption

	Major Technological Changes (Probit)					
	(1)	(2)	(3)	(4)	(5)	(6)
Crop Yield (pre-1500)	0.10**	0.13**	0.12**	0.16**	0.30***	0.33***
	(0.05)	(0.05)	(0.05)	(0.08)	(0.08)	(0.08)
Crop Yield Ch. (post-1500)			-0.02	0.00	0.03	-0.01
			(0.06)	(0.07)	(0.07)	(0.09)
Crop Cycle (pre-1500)				-0.07	-0.04	-0.01
				(0.09)	(0.08)	(0.08)
Crop Growth Cycle Ch. (post-1500)				-0.02	0.03	0.02
				(0.06)	(0.06)	(0.06)
Geographical Controls	No	Yes	Yes	Yes	Yes	Yes
Language Family FE	No	No	No	No	Yes	Yes
Continental FE	No	No	No	No	No	Yes
Pseudo-R^2	0.04	0.13	0.13	0.14	0.34	0.37
Observations	86	86	86	86	86	86

Notes: The table establishes the effect of pre-1500CE crop yield, growth cycle, and their changes on technological progress as reflected in the adoption of industrialization, factories, mining, large machinery, etc.. The table reports the average marginal effects of Probit regressions. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable. Geographical controls include absolute latitude, area of ethnic homeland, mean elevation, mean precipitation and temperature levels, terrain ruggedness, share of land within 100km of sea, length of coastline, and malaria ecology. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

8 Concluding Remarks

This research explores the role of evolutionary processes in the emergence and persistence of cultural traits across countries and regions. It advances the hypothesis and establishes empirically that geographical variations in the natural return to agricultural investment have had a persistent effect on the distribution of time preference across societies, highlighting the role of the forces of natural selection and cultural evolution in the propagation of this trait over time. The methodology advanced in this research could be exploited to shed light on the geographical origins of the contemporary distribution of human traits (e.g., risk aversion, cooperation, trust, entrepreneurship, individualism) and their pivotal role in comparative economic development. In particular, the identification of the importance of evolutionary processes in linking initial geographical conditions and contemporary economic outcomes provides a novel angle that may be further exploited in future research to explore the mechanisms through which historical factors have affected differentially the development process across the globe.

Furthermore, the identification of the deep roots of the contemporary distribution of time preference across the globe provides an essential ingredient in the long-standing quest for understanding and quantifying the effect of time preference on comparative economic development. In particular, the agricultural origins of time preference permit the exploration of the reduced form effect of a determinant of long-term orientation on human behavior and economic development.

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Appendix (Online Publication Only)

A Supplementary Material

Table A.1: Crops and their Variants: Caloric Content

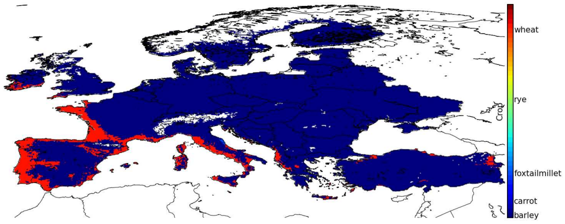
Crop	Energy†	Crop	Energy†
Alfalfa	0.23	Palm Heart	1.15
Banana	0.89	Pearl Millet	3.78
Barley	3.52	Phaseolus Bean	3.41
Buckwheat	3.43	Pigeon Pea	3.43
Cabbage	0.25	Rye	3.38
Cacao	5.98	Sorghum	3.39
Carrot	0.41	Soybean	4.46
Cassava	1.6	Sunflower	5.84
Chick Pea	3.64	Sweet Potato	0.86
Citrus	0.47	Tea	0.01
Coconut	3.54	Tomato	0.18
Coffee	0.01	Wetland Rice	3.7
Cotton	5.06	Wheat	3.42
Cowpea	1.17	Wheat Hard Red Spring	3.29
Dry Pea	0.81	Wheat Hard Red Winter	3.27
Flax	5.34	Wheat Hard White	3.42
Foxtail Millet	3.78	Wheat Soft Red Winter	3.31
Greengram	3.47	Wheat Soft White	3.4
Groundnuts	5.67	White Potato	0.77
Indigo Rice	3.7	Yams	1.18
Maize	3.65	Giant Yams	1.18
Oat	2.46	Sorghum (Subtropical)	3.39
Oilpalm	8.84	Sorghum (Tropical Highland)	3.39
Olive	1.45	Sorghum (Tropical Lowland)	3.39
Onion	0.4	White Yams	1.18

Source: USDA Nutrient Database for Standard Reference (R25). † kilo calories per 1g.

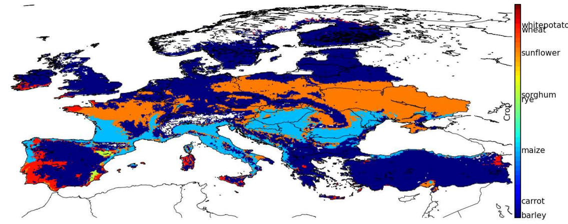
Table A.2: Crops and their Variants: Continental Distribution pre-1500CE

Crop	Continent	Crop	Continent
Alfalfa	Asia, Europe	Palm Heart	North Africa, Subsahara
Banana	Asia, Oceania, North Africa	Pearl Millet	Asia, North Africa, Subsahara
Barley	Asia, Europe, North Africa	Phaseolus Bean	America
Buckwheat	Asia	Pigeon Pea	Asia, Subsahara
Cabbage	Europe	Rye	Europe
Cacao	America	Sorghum	North Africa, Subsahara
Carrot	Asia, Europe	Soybean	Asia
Cassava	America	Sunflower	America
Chick Pea	Europe	Sweet Potato	America
Citrus	Asia, Europe	Tea	Asia
Coconut	America, Oceania	Tomato	America
Coffee	North Africa	Wetland Rice	Asia, Subsahara
Cotton	America, Asia, Europe, North Africa, Subsahara	Wheat	Asia, Europe, North Africa
Cowpea	Asia, North Africa, Subsahara	Wheat Hard Red Spring	Asia, Europe, North Africa
Dry Pea	Europe, North Africa	Wheat Hard Red Winter	Asia, Europe, North Africa
Flax	Asia, Europe, North Africa	Wheat Hard White	Asia, Europe, North Africa
Foxtail Millet	Asia, Europe, North Africa	Wheat Soft Red Winter	Asia, Europe, North Africa
Greengram	Asia, Subsahara	Wheat Soft White	Asia, Europe, North Africa
Groundnuts	America	White Potato	America
Indigo Rice	Asia, Subsahara	Yams	Asia, Subsahara
Maize	America	Giant Yams	Asia, Subsahara
Oat	Europe, North Africa	Sorghum (Subtropical)	North Africa, Subsahara
Oilpalm	North Africa, Subsahara	Sorghum (Tropical Highland)	North Africa, Subsahara
Olive	Europe, North Africa	Sorghum (Tropical Lowland)	North Africa, Subsahara
Onion	America, Asia, Europe, North Africa, Subsahara, Oceania	White Yams	North Africa, Subsahara

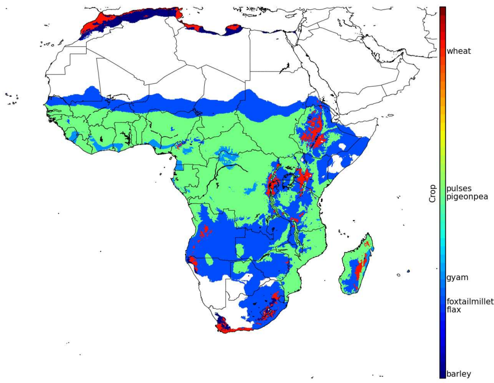
Notes: Based on various sources, including Crosby (1972) and Diamond (1997).



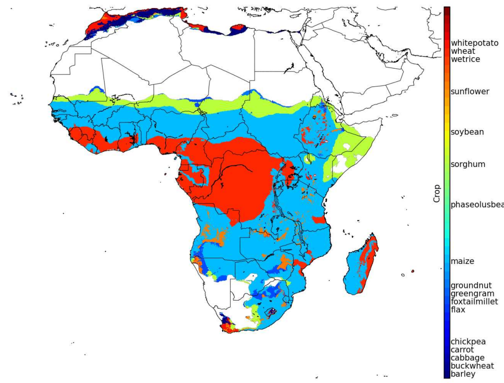
(a) Europe pre-1500CE Crops



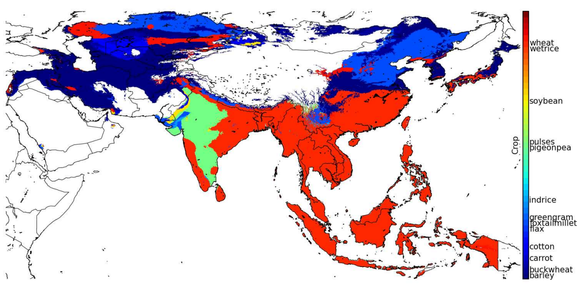
(b) Europe post-1500CE Crops



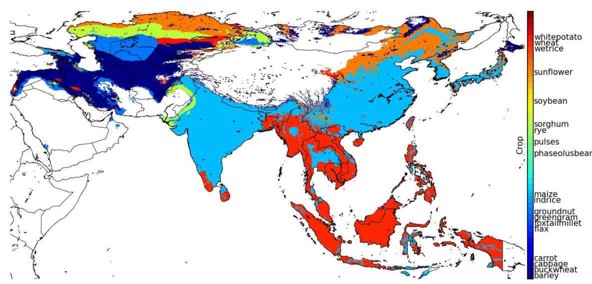
(c) Africa pre-1500CE Crops



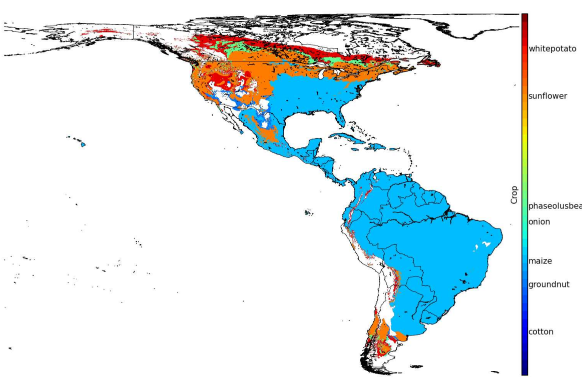
(d) Africa post-1500CE Crops



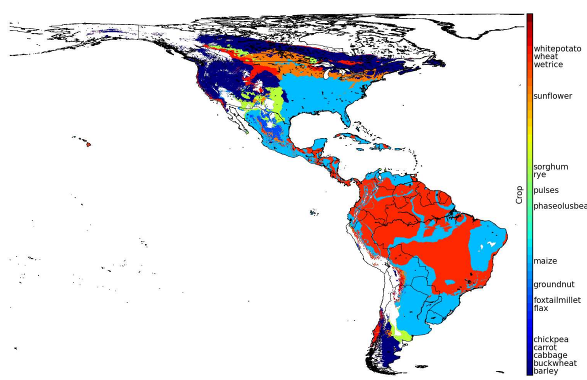
(e) Asia pre-1500CE Crops



(f) Asia post-1500CE Crops



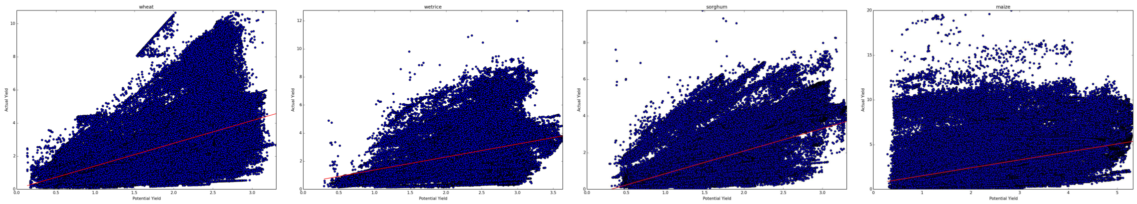
(g) America pre-1500CE Crops



(h) America post-1500CE Crops

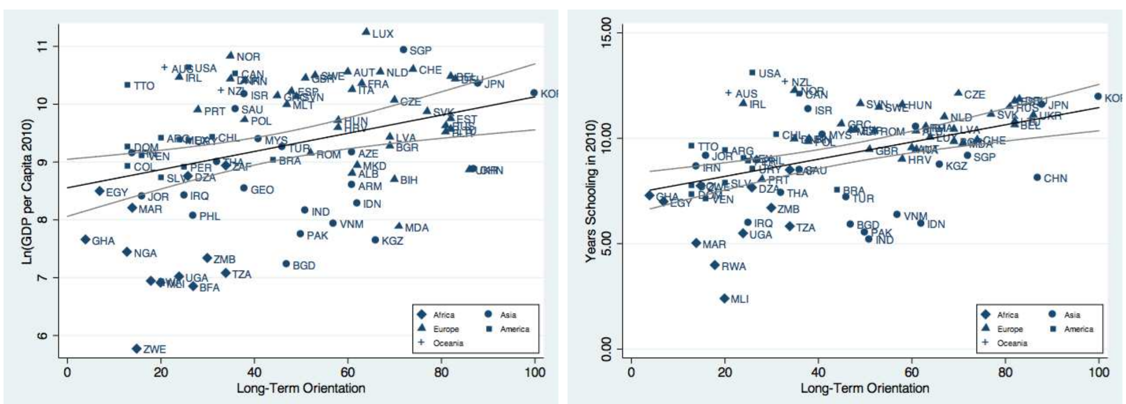
Figure A.1: Potential Crop by Region and Period

Notes: Figure A.1 shows for each cell in the world the highest caloric yield producing crop in the pre- and the post-1500CE era. It is apparent that: (i) few crops dominated each continent in pre-1500CE era, (ii) in the post-1500 era the number of crops within each region expanded dramatically, and (iii) the expansion in available crops changes the highest caloric yield producing crop in most regions of the world.

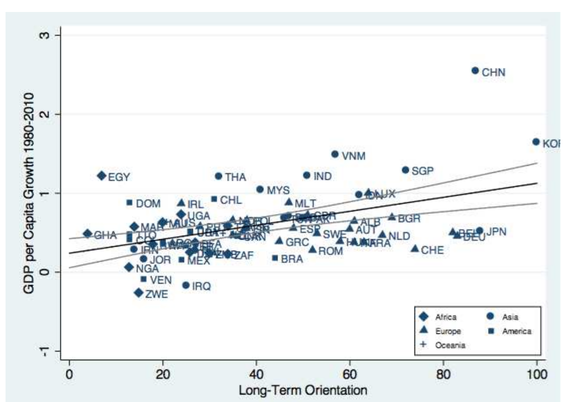


(a) Wheat (b) Wetland Rice (c) Sorghum (d) Maize

Figure A.2: Potential and Actual Crop Yields: Correlations



(a) GDP per capita in 2010 and LTO (b) Schooling in 2010 and LTO



(c) GDP per capita growth between 1980 and 2010 and LTO

Figure A.3: Hofstede's Long-Term Orientation and Development Outcomes

B Additional Results

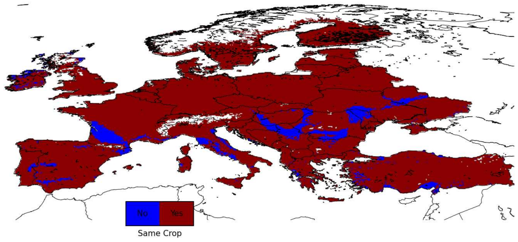
B.1 Crop Return, Crop Choices, Multi-Cropping and Long-Term Orientation

The analysis in section 4 focuses on the effect of crop yield and crop growth cycle on Long-Term Orientation. This specification captures the testable implications of the proposed theory as described in section 2.8. Alternative modeling, could suggests however that the formation of Long-Term Orientation is affected by the daily crop return (e.g., the ratio of crop yield to crop growth cycle).

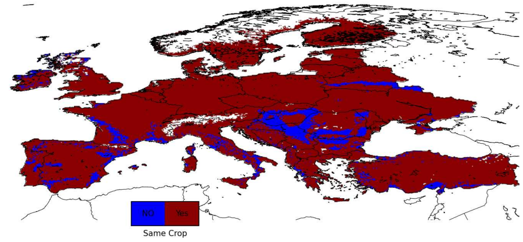
As depicted in Figure B.1, in most cells across the globe, crops the maximize caloric yield are the ones that generate the highest daily return. Hence, a-priori this alternative specification is unlikely to affect the qualitative analysis. Indeed, as established in Table B.1, the qualitative analysis reported in Table 1, is unaffected if potential caloric daily return, rather than potential caloric yield (for the set of crops that are selected based on their highest caloric yield) is used as the main independent variable

Moreover, as established in Tables B.2 and B.3, the effect of either crop yield or daily crop return on Long-Term Orientation is robust for the selection of crops in each cell based on either their highest caloric yield or highest daily return. Furthermore, as reported in Tables B.4 and B.5, the results are robust the use of the average caloric yield or the average daily crop return across all crops in the cell.

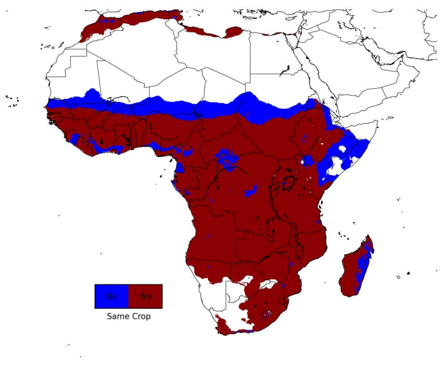
Finally, while multi-cropping within a year (of either the same crop or various crops) is not feasible across most cell across the globe, the results are robust to the feasibility of multi-cropping. First, if the same crop is used for multi-cropping, the daily crop return in each location will remain unchanged and the effect of daily crop return on Long-Term Orientation, as reported in Table B.3, captures the feasibility of multi-cropping of the same crop. Second, if multi-cropping is associated with various crops, daily crop return under multi-cropping can be approximated by the average daily crop return across all crops in a cell, and the effect of average daily crop return (across all crops in the cell) on Long-Term Orientation as reported in Table B.5 captures the feasibility of multi-cropping of different crops.



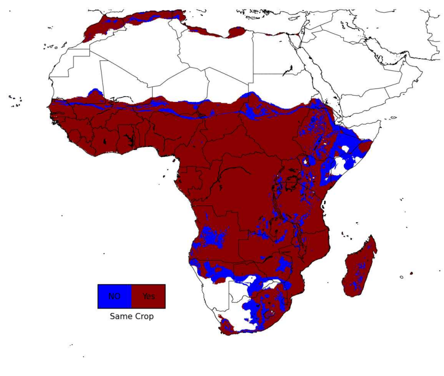
(a) Europe pre-1500CE Crops



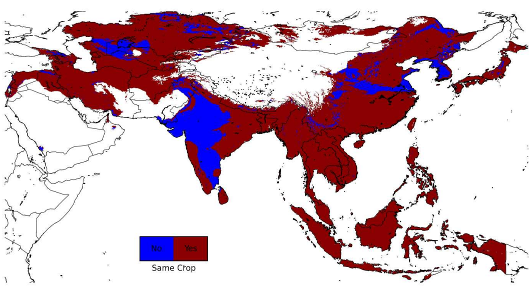
(b) Europe post-1500CE Crops



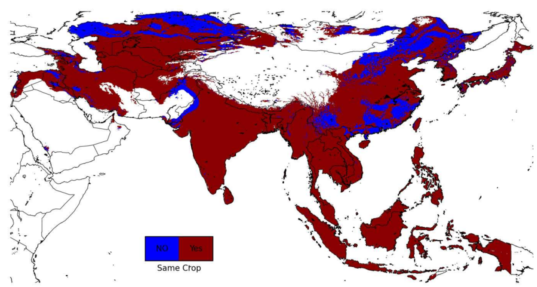
(c) Africa pre-1500CE Crops



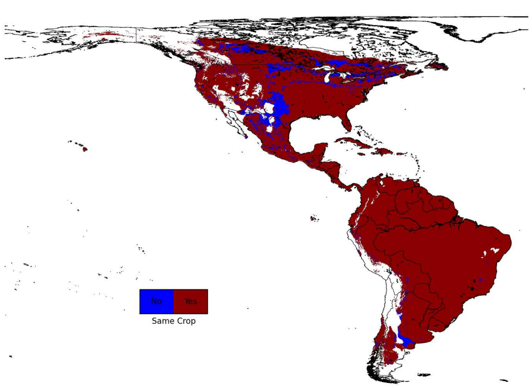
(d) Africa post-1500CE Crops



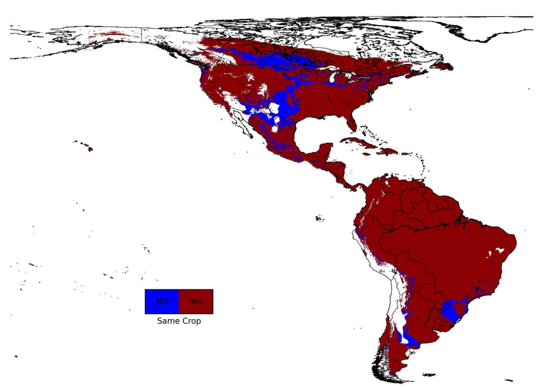
(e) Asia pre-1500CE Crops



(f) Asia post-1500CE Crops



(g) America pre-1500CE Crops



(h) America post-1500CE Crops

Figure B.1: Crop Selection under Crop Yield and Daily Return

Table B.1: Daily Crop Return, Crop Growth Cycle, and Long-Term Orientation

	Long-Term Orientation							
	Whole World						Old World	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Daily Crop Return	5.71**	9.40***	8.39***	7.00***			10.83***	9.28***
	(2.39)	(2.57)	(2.44)	(2.59)			(2.69)	(2.82)
Crop Growth Cycle				4.04				4.57
				(3.58)				(3.85)
Daily Crop Return (Ancestors)					9.00***	7.57***		
					(2.41)	(2.63)		
Crop Growth Cycle (Ancestors)						4.23		
						(3.79)		
Absolute latitude		3.07	2.07	3.32	2.58	4.08	3.40	5.22
		(4.10)	(3.82)	(4.32)	(3.78)	(4.24)	(4.59)	(5.31)
Mean elevation		6.44*	7.19**	6.39*	6.78*	6.07*	5.98	5.32
		(3.38)	(3.47)	(3.42)	(3.42)	(3.26)	(4.11)	(3.84)
Terrain Roughness		-6.66**	-6.09**	-6.10**	-7.05**	-7.08**	-6.15*	-6.46*
		(2.67)	(2.94)	(2.95)	(3.01)	(3.01)	(3.31)	(3.26)
Neolithic Transition Timing			-6.13*	-6.83**			-5.14*	-5.78*
			(3.11)	(3.18)			(2.93)	(2.94)
Neolithic Transition Timing (Ancestors)					-4.87*	-5.41**		
					(2.62)	(2.66)		
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Geographical Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Old World Sample	No	No	No	No	No	No	Yes	Yes
Adjusted-R^2	0.51	0.58	0.59	0.60	0.59	0.60	0.55	0.56
Observations	87	87	87	87	87	87	72	72

Notes: The table establishes the positive, statistically, and economically significant effect of a country's potential daily crop return (measured in calories per hectare per day) on its level of Long-Term Orientation (measured on a scale of 0 to 100), accounting for continental fixed effects and other geographical characteristics. In particular, columns (1)-(3) show the effect of daily crop return, accounting for the country's absolute latitude, mean elevation above sea level, terrain roughness, distance to a coast or river, being landlocked or an island, and the time since it transitioned to agriculture. Columns (4)-(6) establish the robustness of the effect for the inclusion of crop growth cycle and the effects of migration. Columns (7)-(8) show that restricting the analysis to the Old World, where intercontinental migration played a smaller role, does not alter the qualitative results. Additional geographical controls include distance to coast or river, and landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.2: Crop Yield, Growth Cycle, and Long-Term Orientation: Robustness to Crop Choice

	Long-Term Orientation					
	Highest Yield			Highest Return		
	(1)	(2)	(3)	(4)	(5)	(6)
Crop Yield (Ancestors)	8.20***	11.58***	13.31***	5.32**	9.56***	8.61***
	(2.44)	(2.15)	(2.94)	(2.52)	(2.44)	(3.17)
Crop Growth Cycle (Anc.)			-3.15			1.86
			(3.52)			(4.36)
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls	No	Yes	Yes	No	Yes	Yes
Neolithic	No	Yes	Yes	No	Yes	Yes
Adjusted-R^2	0.56	0.66	0.66	0.51	0.61	0.60
Observations	87	87	87	87	87	87

Notes: The table establishes that the effect of a country's potential crop yield on its level of Long-Term Orientation is robust for the selection of crops in each cell based on either their highest caloric yield or highest daily return. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.3: Crop Return, Growth Cycle, and Long-Term Orientation: Robustness to Crop Choice and Multi-Cropping of the Same Crop

	Long-Term Orientation					
	Highest Yield			Highest Return		
	(1)	(2)	(3)	(4)	(5)	(6)
Crop Return (Ancestors)	5.39**	9.00***	7.57***	9.35***	11.49***	10.36***
	(2.44)	(2.41)	(2.63)	(2.34)	(2.31)	(2.60)
Crop Growth Cycle (Anc.)			4.23			3.06
			(3.79)			(3.50)
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls	No	Yes	Yes	No	Yes	Yes
Neolithic	No	Yes	Yes	No	Yes	Yes
Adjusted-R^2	0.51	0.59	0.60	0.57	0.65	0.65
Observations	87	87	87	87	87	87

Notes: The table establishes that the effect of a country's potential daily crop return on its level of Long-Term Orientation is robust for the selection of crops in each cell based on either their highest caloric yield or highest daily return. Moreover, it establishes the robustness of the results for the feasibility of multi-cropping of the same crop. In particular, if the same crop is used for multi-cropping, the daily crop return in each location will remain unchanged and the effect of daily crop return on Long-Term Orientation captures the feasibility of multi-cropping of the same crop. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.4: Average Crop Yield, Average Growth Cycle, and Long-Term Orientation

	Long-Term Orientation							
	Whole World						Old World	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Avg. Crop Yield	8.72***	11.33***	10.83***	12.00***			12.52***	15.50***
	(2.59)	(2.75)	(2.47)	(3.56)			(2.59)	(3.98)
Avg. Crop Growth Cycle				-2.96				-7.07
				(5.85)				(6.65)
Avg. Crop Yield (Anc.)					11.96***	14.55***		
					(2.42)	(3.30)		
Avg. Crop Growth Cycle (Anc.)						-6.52		
						(5.06)		
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Neolithic	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Old World Sample	No	No	No	No	No	No	Yes	Yes
Adjusted-R^2	0.55	0.61	0.64	0.63	0.65	0.66	0.60	0.60
Observations	87	87	87	87	87	87	72	72

Notes: The table establishes the positive and significant effect of a country's average potential crop yield on its level of Long-Term Orientation, accounting for continental fixed effects, geographical characteristics, the time elapsed since the transition to agriculture, as well as the average growth cycle. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.5: Average Crop Return, Average Growth Cycle, and Long-Term Orientation: Robustness to Crop Choice and Multi-Cropping of Different Crops

	Whole World						Old World	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Avg. Crop Return	10.17***	12.57***	11.68***	10.91***			13.59***	13.59***
	(2.60)	(2.81)	(2.58)	(3.04)			(2.74)	(3.42)
Avg. Crop Growth Cycle				1.69				-0.01
				(3.41)				(3.88)
Avg. Crop Return					12.47***	12.43***		
					(2.55)	(2.82)		
Avg. Crop Growth Cycle						0.09		
						(2.74)		
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Neolithic	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Old World Sample	No	No	No	No	No	No	Yes	Yes
Adjusted-R^2	0.58	0.62	0.64	0.64	0.66	0.65	0.61	0.60
Observations	87	87	87	87	87	87	72	72

Notes: The table establishes the positive and significant effect of the average potential crop return on its level of Long-Term Orientation, accounting for continental fixed effects, geographical characteristics, the time elapsed since the transition to agriculture, as well as the average growth cycle. Moreover, it establishes the robustness of the results for the feasibility of multi-cropping of different crop, where the daily crop return under multi-cropping is approximated by the average daily crop return across all crops in a cell. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.2 The Natural Experiment Generated by the Columbian Exchange

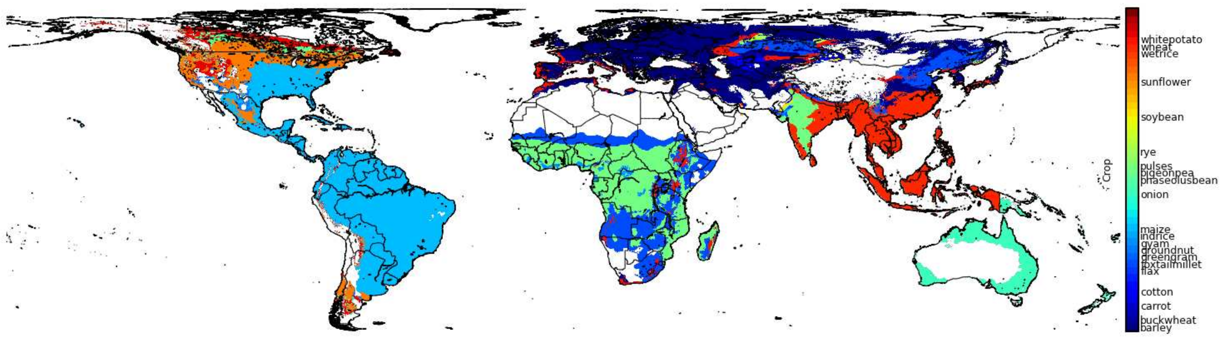
B.2.1 Roots of the Natural Experiment

The expansion of suitable crops for cultivation in the post-1500 period, and its impact on caloric yield (depicted in Figures B.2 and B.3) is an important element in the identification strategy developed in this paper. The Columbian Exchange brought about an increase in potential crop yield in a given grid if and only if the potential yield of a newly introduced crop is larger than the potential yield of the originally dominating crop. Hence, a priori, by construction, conditional on the potential pre-1500CE crop yield, the potential assignment of crops associated with this natural experiment ought to be independent of any other attributes of the grid, and the estimated causal effect of the change in potential crop yield is unlikely to be driven by omitted characteristics of the region.

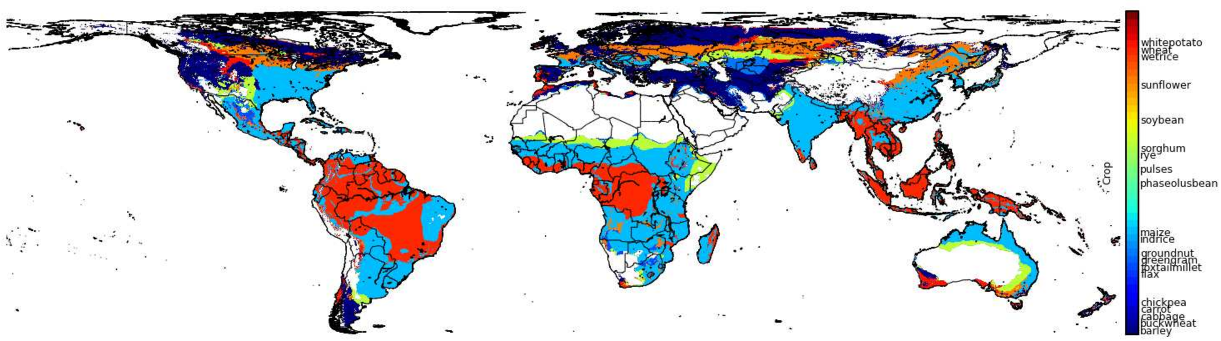
Table B.6 explores a range of geographical characteristics that may be associated with the change in potential yield and growth cycles. Indeed, changes in potential yield are negatively correlated crop yield in the pre-1500 period, but is largely uncorrelated with other geographical characteristics (except for the crop growth cycle that is highly correlated with crop yield). Moreover, changes in potential growth cycle are largely uncorrelated with other geographical characteristics. Similar patterns are present in the extended sample of 162 countries for which all geographical controls are available (Table B.7). Thus, the results based on the Columbian Exchange are unlikely to be biased by other omitted regional characteristics.

B.2.2 Independence of Selection on Unobservables

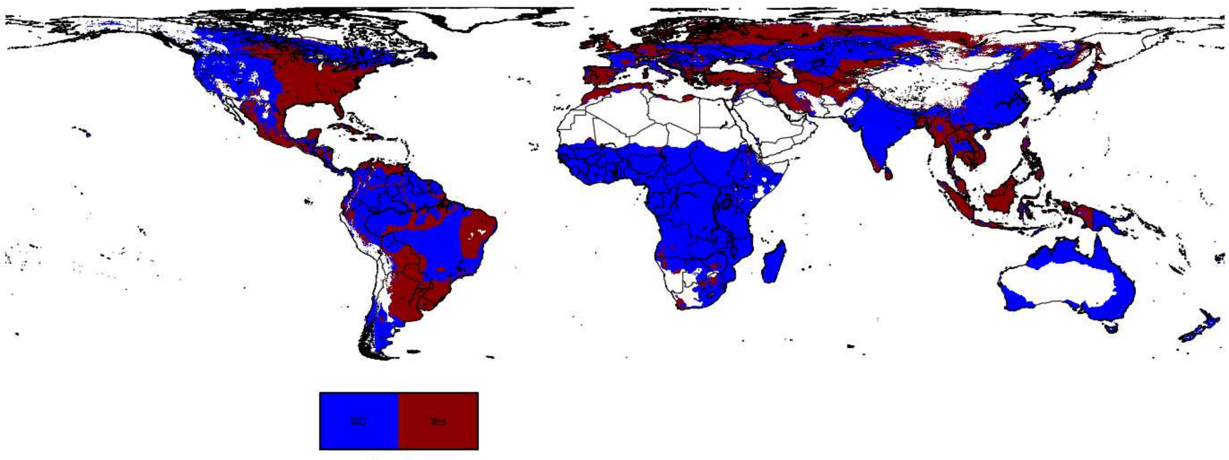
This subsection further establishes that the changes in crop yield and growth cycle are unaffected by selection on unobservables and spatial correlation. As established in Table B.8, following Altonji et al. (2005) and Bellows and Miguel (2009), selection on unobservables would have to be significantly larger than selection on observables in order to account for the effect of crop yield on Long-Term Orientation. Furthermore, following Oster (2014), assuming that unobservables are equally strongly correlated as observables, and that all the variation in Long-Term Orientation can be explained, the estimated coefficient on the change of crop yield remains strictly positive and economically significant and thus one can reject the hypothesis that the value of the coefficient is driven exclusively by unobservables.



(a) World pre-1500CE Crops

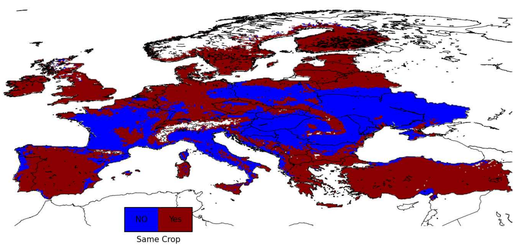


(b) World post-1500CE Crops

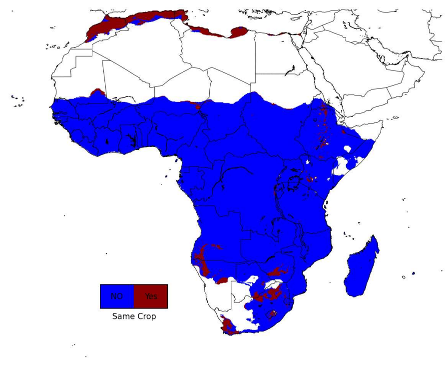


(c) Same Crop pre- and post1500CE

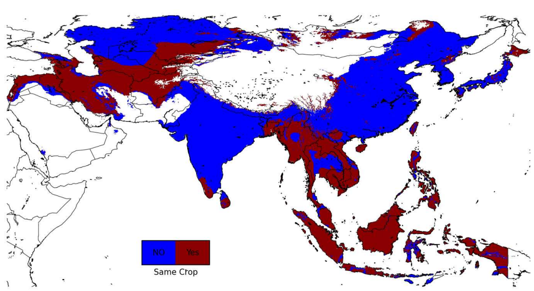
Figure B.2: Crops that Maximize Potential Crop Yield: pre- and post-1500CE



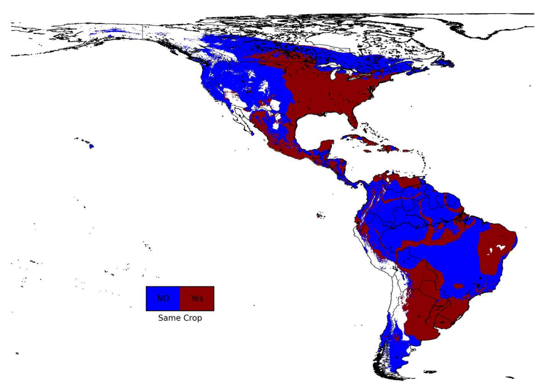
(a) Europe



(b) Africa



(c) Asia



(d) America

Figure B.3: Changes in Crops (that Maximize Potential Crop Yield) after the Columbian Exchange

Table B.6: Correlates of Post-1500 Changes in Crop Yield and Growth Cycle

	Change in Caloric Yield					Change in Crop Growth Cycle				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Crop Yield (pre-1500)	-0.27*	-0.52***	-0.22*	-0.54***	-0.30**	0.11	0.22*	0.27	0.29	0.32
	(0.14)	(0.11)	(0.12)	(0.13)	(0.13)	(0.11)	(0.13)	(0.18)	(0.19)	(0.23)
Crop Growth Cycle (pre-1500)		0.77***	0.40**	0.77***	0.51**		-0.35*	-0.35	-0.54**	-0.45
		(0.14)	(0.16)	(0.19)	(0.21)		(0.19)	(0.25)	(0.22)	(0.33)
Absolute Latitude				-0.43	-0.30				-0.63	-0.96*
				(0.39)	(0.33)				(0.48)	(0.57)
Mean Elevation				0.08	-0.12				0.52	0.39
				(0.21)	(0.22)				(0.32)	(0.32)
Terrain Roughness				-0.13	0.05				-0.11	-0.08
				(0.14)	(0.14)				(0.16)	(0.15)
Distance to Coast or River				0.03	-0.01				-0.07	-0.09
				(0.10)	(0.08)				(0.14)	(0.14)
Landlocked				0.07	-0.04				-0.21	-0.26
				(0.08)	(0.07)				(0.13)	(0.17)
Island				-0.01	-0.13				0.13	0.13
				(0.15)	(0.12)				(0.10)	(0.12)
Pct. Land in Tropics				-0.89**	-0.70**				-0.76	-0.74
				(0.34)	(0.30)				(0.52)	(0.48)
Pct. Land in Temperate Zone				0.20	0.09				0.47	0.31
				(0.19)	(0.19)				(0.30)	(0.32)
Pct. Land in Tropics and Subtropics				1.04***	0.71*				0.50	0.43
				(0.37)	(0.40)				(0.47)	(0.50)
Precipitation				-0.16	-0.10				0.02	-0.04
				(0.17)	(0.18)				(0.18)	(0.28)
Temperature				-0.27	-0.33				-0.03	-0.41
				(0.30)	(0.33)				(0.43)	(0.56)
Continental FE	No	No	Yes	No	Yes	No	No	Yes	No	Yes
Adjusted-R^2	0.05	0.33	0.61	0.46	0.63	-0.00	0.05	0.03	0.19	0.16
Observations	87	87	87	87	87	87	87	87	87	87

Notes: The table establishes that change in potential yield is negatively correlated crop yield in the pre-1500 period but is largely uncorrelated with other geographical characteristics, except for the crop growth cycle, whereas changes in crop growth cycle are largely uncorrelated with other geographical characteristics. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.7: Correlates of Post 1500 Changes in Crop Yield and Growth Cycle: Extended Sample

	Change in Crop Yield					Change in Crop Growth Cycle				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Crop Yield (pre-1500)	-0.13*	-0.49***	-0.25***	-0.62***	-0.42***	-0.09	0.12	0.22	0.35*	0.40
	(0.08)	(0.09)	(0.08)	(0.11)	(0.09)	(0.09)	(0.15)	(0.21)	(0.21)	(0.24)
Crop Growth Cycle (pre-1500)		0.49***	0.32***	0.43***	0.35***		-0.29*	-0.36*	-0.38**	-0.41**
		(0.08)	(0.07)	(0.07)	(0.07)		(0.17)	(0.21)	(0.17)	(0.19)
Absolute Latitude				-0.27	0.13				-0.93**	-0.95*
				(0.25)	(0.25)				(0.46)	(0.49)
Mean Elevation				0.29**	0.15				0.20	0.07
				(0.13)	(0.13)				(0.20)	(0.22)
Terrain Roughness				-0.25***	-0.06				-0.01	0.06
				(0.09)	(0.08)				(0.12)	(0.12)
Distance to Coast or River				-0.02	-0.08				0.14	0.13
				(0.07)	(0.07)				(0.17)	(0.17)
Landlocked				0.03	-0.01				-0.01	-0.04
				(0.07)	(0.06)				(0.11)	(0.12)
Island				0.11	-0.02				0.05	0.08
				(0.09)	(0.07)				(0.08)	(0.07)
Pct. Land in Tropics				-0.68***	-0.61***				-0.85***	-0.88***
				(0.20)	(0.18)				(0.29)	(0.30)
Pct. Land in Temperate Zone				0.43***	0.23				0.31	0.19
				(0.14)	(0.14)				(0.21)	(0.27)
Pct. Land in Tropics and Subtropics				0.92***	0.80***				0.02	-0.02
				(0.22)	(0.22)				(0.30)	(0.30)
Precipitation				-0.04	-0.07				0.22	0.26
				(0.12)	(0.10)				(0.19)	(0.19)
Temperature				0.02	0.07				-0.11	-0.43
				(0.23)	(0.25)				(0.36)	(0.40)
Continental FE	No	No	Yes	No	Yes	No	No	Yes	No	Yes
Adjusted-R^2	0.01	0.26	0.51	0.42	0.58	0.00	0.05	0.06	0.24	0.24
Observations	162	162	162	162	162	162	162	162	162	162

Notes: The table demonstrates the robustness of the result in Table B.6 for an extended sample of 162 countries for which the entire set of geographical controls are available. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.8: Crop Yield, Crop Growth Cycle, and Long-Term Orientation: Selection on Unobservables

	Long-Term Orientation					
	Whole World				Old World	
	(1)	(2)	(3)	(4)	(5)	(6)
Crop Yield Change (post-1500)	11.28***	9.51***				
	(2.92)	(2.92)				
Crop Growth Cycle Change (post-1500)	-0.67	-1.51				
	(1.84)	(1.81)				
Crop Yield Change (Anc., post-1500)			10.20***	8.83***	11.25***	8.39***
			(2.50)	(2.36)	(2.72)	(2.88)
Crop Growth Cycle Change (Anc., post-1500)			0.79	-0.73	0.16	-1.45
			(1.75)	(1.78)	(1.87)	(1.93)
Crop Yield (Ancestors, pre-1500)	10.03***	10.74***	9.90***	11.31***	10.46***	12.18***
	(2.31)	(2.76)	(2.30)	(2.70)	(2.43)	(3.05)
Crop Growth Cycle (Ancestors, pre-1500)	-11.29***	-6.47	-11.59***	-6.85*	-12.27***	-5.69
	(3.22)	(3.90)	(3.23)	(3.65)	(3.38)	(4.24)
	Change Crop Yield					
AET		5.38		6.43		2.93
δ		2.13		2.51		1.45
β^*		6.21		6.25		3.32
	Change Crop Growth Cycle					
AET		-1.81		-0.48		-0.90
δ		-0.94		-0.25		-0.49
β^*		-3.06		-3.58		-4.29
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes
All Geographical Controls & Neolithic	No	Yes	No	Yes	No	Yes
Old World Subsample	No	No	No	No	Yes	Yes
R^2	0.65	0.77	0.67	0.78	0.62	0.76
Adjusted-R^2	0.61	0.70	0.62	0.71	0.58	0.67
Observations	87	87	87	87	72	72

Notes: The table shows the robustness of the results of Table 2 to selection by unobservables. It presents the Altonji et al. (2005) AET ratio as extended by Bellows and Miguel (2009). Additionally, it presents the δ and $\beta^*(1,1)$ statistics suggested by Oster (2014). All statistics suggest that the results are not driven by unobservables. Heteroskedasticity robust standard errors in round parenthesis. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.2.3 Robustness to Grids that Experienced a Change in Crops

Table B.9 establishes that the results presented in Table 2 do not change qualitatively if only grids that experienced a change in the dominating crop in the course of the Columbian exchange are included in the analysis. Moreover, the table expands the set of geographical controls and includes precipitation and the shares of land in tropical, subtropical, and temperate climate zones.

Table B.9: Crop Yield, Growth Cycle, and Long-Term Orientation:
Grids that Experienced a Post-1500 Change in Yield

	Long-Term Orientation							
	Whole World						Old World	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield (pre-1500)	4.97**	7.91***	6.75***	6.36**			6.26**	7.20**
	(2.28)	(2.22)	(2.48)	(2.75)			(2.65)	(3.23)
Crop Yield Change (post-1500)			4.47*	6.28**			6.29**	8.94***
			(2.35)	(2.39)			(2.79)	(2.83)
Crop Growth Cycle (pre-1500)				-0.90				-3.29
				(2.51)				(3.73)
Crop Growth Cycle Change (post-1500)				-4.57**				-4.91**
				(1.99)				(2.12)
Crop Yield (Anc., pre-1500)					7.17***	7.06**		
					(2.33)	(3.02)		
Crop Yield Change (Anc., post-1500)					6.04***	7.67***		
					(1.91)	(2.00)		
Crop Growth Cycle (Anc., pre-1500)						-1.99		
						(2.96)		
Crop Growth Cycle Change (Anc., post-1500)						-3.93*		
						(2.04)		
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All Geographical Controls & Neolithic	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Old World Sample	No	No	No	No	No	No	Yes	Yes
Adjusted-R^2	0.51	0.64	0.64	0.66	0.67	0.69	0.58	0.61
Observations	87	87	87	87	87	87	72	72

Notes: The table establishes that the results presented in Table 2 do not change qualitatively if only grids that experienced a change in the dominating crop in the course of the Columbian exchange are included in the analysis. Moreover, the table expands the set of geographical controls and includes precipitation and the shares of land in tropical, subtropical, and temperate climate zones. Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, landlocked and island dummies, mean temperature, precipitation, and shares of land in tropical, subtropical and in temperate climate zones. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.2.4 Robustness to Exclusion of Asian Crop Varieties from Sub-Saharan Africa pre-1500

This subsection establishes the robustness of analysis in able 2 to the exclusion of Asian crop varieties from the set of available crops in Sub-Saharan Africa in the pre-1500 period. In particular, the assignment of Asian varieties of rice to Sub-Saharan Africa prior to 1500CE is debatable. Thus, the analysis constructs an alternative set of measures of crop yield and crop growth cycles that excludes wetland (Oryza japonica) and indica (Oryza indica) rice, as well as green gram, from the set of crops available for cultivation in Sub-Saharan Africa in the pre-1500CE era. As established in Table B.10, the effect of pre-1500CE crop yield and its change in the course of the Columbian Exchange on Long-term Orientation is even larger if Asian crop varieties are excluded from Sub-Saharan Africa in the pre-1500 period.

Table B.10: Crop Yield, Growth Cycle, and Long-Term Orientation:
Robustness to Exclusion of Asian Crop Varieties from Sub-Saharan Africa

	Long-Term Orientation							
	Whole World						Old World	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield (pre-1500)	6.28**	6.05***	7.07***	9.66**			12.59***	18.80***
	(2.64)	(2.22)	(2.48)	(3.68)			(3.41)	(4.22)
Crop Yield Change (post-1500)		9.95**	11.97***	13.34***			10.27**	14.17***
		(4.27)	(3.97)	(4.22)			(4.11)	(4.50)
Crop Growth Cycle (pre-1500)				-6.58				-14.53**
				(5.86)				(6.32)
Crop Growth Cycle Change (post-1500)				0.43				0.04
				(3.05)				(2.58)
Crop Yield (Anc., pre-1500)					9.65***	13.49***		
					(2.36)	(2.80)		
Crop Yield Change (Anc., post-1500)					9.86***	14.27***		
					(3.02)	(3.03)		
Crop Growth Cycle (Anc., pre-1500)						-14.77***		
						(4.87)		
Crop Growth Cycle Change (Anc., post-1500)						0.58		
						(2.61)		
Neolithic Transition Timing			-7.01**	-5.81*			-5.02*	-2.41
			(2.90)	(3.00)			(2.78)	(2.82)
Neolithic Transition Timing (Anc.)					-4.97**	-3.52		
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Old World Sample	No	No	No	No	No	No	Yes	Yes
Adjusted-R^2	0.51	0.55	0.63	0.63	0.66	0.70	0.61	0.64
Observations	87	87	87	87	87	87	72	72

Notes: The table establishes the robustness of the results in Table 2 to the exclusion of Asian crop varieties from the set of available crops in Sub-Saharan Africa in the pre-1500 period. Geographical controls include absolute latitude, mean elevation, terrain roughness, distance to coast or river, and landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.2.5 Sorting vs. Cultural Evolution

This subsection further explores the role of sorting vs cultural evolution in the established relationship in Table 2. In particular, it establishes the robustness of the results in Table 2 to constraining the sample to countries where at least 90% of the population are descendants of their indigenous populations, mitigating the potential effect of sorting on Long-Term Orientation in the post-1500 era. As established in Table B.11, the positive and significant effect of changes in crop yield on Long-Term orientation is maintained reinforcing the interpretation that this effect captures the forces of cultural evolution, rather than sorting.

Table B.11: Crop Yield, Growth Cycle, and Long-Term Orientation: Countries with High Share of Natives

	Long-Term Orientation			
	Old World			
	(1)	(2)	(3)	(4)
Crop Yield (pre-1500)	8.49**	8.58***	13.95***	17.55***
	(3.44)	(3.05)	(3.49)	(3.94)
Crop Yield Change (post-1500)		9.62***	10.00***	13.27***
		(3.53)	(3.20)	(3.74)
Crop Growth Cycle (pre-1500)				-8.64*
				(5.08)
Crop Growth Cycle Change (post-1500)				1.04
				(2.12)
Neolithic Transition Timing			-2.57	-1.04
			(4.46)	(4.39)
Continent FE	Yes	Yes	Yes	Yes
Geographical Controls	No	No	Yes	Yes
Adjusted-R^2	0.43	0.52	0.58	0.60
Observations	46	46	46	46

Notes: The table establishes the robustness of the results in Table 2 to constraining the sample to countries where at least 90% of the population are descendants of their indigenous populations, mitigating the potential effect of sorting on Long-Term Orientation in the post-1500 era. Geographical controls include absolute latitude, mean elevation, terrain roughness, distance to coast or river, and landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.2.6 Cultural Transmission

This subsection provides additional evidence that reinforces the interpretation that the effect of crop yield captures the forces of cultural evolution. In particular, Table B.12 establishes that in a horse race between the unadjusted measures of crop yield and growth cycle and the ancestry adjusted (and thus culturally embodied) ones, only the ancestry adjusted, culturally embodied measures remain statistically and economically significant.

B.3 Robustness to Spatial Autocorrelation and Selection on Unobservables

This subsection establishes that the qualitative results are unaffected by selection on unobservables and spatial correlation. As established in Tables B.13 and B.14, following Altonji et al. (2005) and

Table B.12: Crop Yield, Growth Cycle, and Long-Term Orientation: Ancestry Adjusted vs. Unadjusted

	Long-Term Orientation				
	(1)	(2)	(3)	(4)	(5)
Crop Yield (Anc., pre-1500)	12.24***	10.10***	8.65**	10.50***	15.14***
	(3.79)	(3.69)	(3.35)	(3.37)	(4.78)
Crop Yield Ch. (Anc., post-1500)				12.65**	7.04
				(5.80)	(5.80)
Crop Growth Cycle (Anc., pre-1500)					-16.42*
					(8.54)
Crop Growth Cycle Ch. (Anc., post-1500)					6.51
					(4.56)
Crop Yield (pre-1500)	-3.69	-0.49	0.35	-2.17	-5.68
	(3.77)	(2.88)	(2.54)	(2.75)	(4.45)
Crop Yield Change (post-1500)				-5.69	4.01
				(6.64)	(7.44)
Crop Growth Cycle Change (post-1500)					-6.48
					(5.23)
Crop Growth Cycle (pre-1500)					9.02
					(7.67)
Continental FE	No	Yes	Yes	Yes	Yes
Geographical Controls	No	Yes	Yes	Yes	Yes
Neolithic	No	No	Yes	Yes	Yes
Adjusted-R^2	0.12	0.58	0.59	0.66	0.68
Observations	87	87	87	87	87

Notes: The table establishes that in a horse race between the unadjusted measures of crop yield and growth cycle and the ancestry adjusted ones, only the ancestry adjusted, culturally embodied, measures remain statistically and economically significant. Geographical controls include absolute latitude, mean elevation, terrain roughness, distance to coast or river, and landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Bellows and Miguel (2009), selection on unobservables would have to be significantly larger than selection on observables in order to account for the effect of crop yield on Long-Term Orientation. Furthermore, following Oster (2014), assuming that unobservables are equally strongly correlated as observables, and that all the variation in Long-Term Orientation can be explained, the estimated coefficient on the change of crop yield remains strictly positive and economically significant and thus one can reject the hypothesis that the value of the coefficient is driven exclusively by unobservables.

Moreover, the corrected standard errors based on Conley (1999) in the square brackets, and those based on the maximum likelihood estimates suggested by Cliff and Ord (1973, 1981) in the curly brackets, indicate that the effect of crop yield on Long-Term Orientation remains highly significant once spatial autocorrelations are accounted for.

Table B.13: Crop Yield, Growth Cycle, and Long-Term Orientation:
Robustness to Spatial Autocorrelation and Selection on Unobservables

	Long-Term Orientation					
	Whole World				Old World	
	(1)	(2)	(3)	(4)	(5)	(6)
Crop Yield	10.23***	10.70***			14.36***	15.26***
	(2.75)	(2.92)			(3.18)	(3.43)
	[3.19]	[2.67]			[3.19]	[2.52]
	{2.60}	{2.54}			{3.05}	{2.97}
Crop Growth Cycle	-4.91	-3.16			-6.83**	-4.00
	(3.20)	(3.50)			(3.39)	(3.55)
	[3.14]	[2.87]			[3.13]	[2.65]
	{3.03}	{3.05}			{3.25}	{3.08}
Crop Yield (Anc.)			12.15***	13.64***		
			(2.74)	(2.87)		
			[2.79]	[2.23]		
			{2.60}	{2.50}		
Crop Growth Cycle (Anc.)			-6.84**	-4.86		
			(3.26)	(3.36)		
			[3.22]	[2.61]		
			{3.09}	{2.93}		
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes
All Geographical Controls & Neolithic	No	Yes	No	Yes	No	Yes
Old World Subsample	No	No	No	No	Yes	Yes
AET		-22.63		-4.00		-17.05
δ		-8.06		-0.90		-4.77
β^*		11.39		17.66		16.31
R^2	0.59	0.76	0.61	0.78	0.56	0.76
Adjusted-R^2	0.55	0.68	0.57	0.71	0.52	0.69
Observations	87	87	87	87	72	72

Notes: The table shows the robustness of the result in Table 2 to spatial autocorrelation and selection on unobservables. The spatial auto-correlation corrected standard errors based on (Conley, 1999) in the square brackets, and those based on the maximum likelihood estimates suggested by Cliff and Ord (1973, 1981) in the curly brackets. Moreover, it reports the Altonji et al. (2005) AET ratio and the δ and $\beta^*(1,1)$ statistics suggested by Oster (2014). Heteroskedasticity robust standard errors in round parenthesis. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.14: Crop Yield, Growth Cycle, and Long-Term Orientation:
Robustness to Spatial Autocorrelation and Selection on Unobservables

	Long-Term Orientation					
	Whole World				Old World	
	(1)	(2)	(3)	(4)	(5)	(6)
Crop Yield (Anc., pre-1500)	8.43***	8.15***	9.90***	11.31***	10.46***	12.18***
	(2.37)	(2.74)	(2.30)	(2.70)	(2.43)	(3.05)
	[2.63]	[2.21]	[1.94]	[2.06]	[1.93]	
	{2.24}	{2.39}	{2.15}	{2.31}	{2.29}	{2.59}
Crop Yield Change (Anc., post-1500)			10.20***	8.83***	11.25***	8.39***
			(2.50)	(2.36)	(2.72)	(2.88)
			[2.80]	[1.78]	[2.87]	
			{2.33}	{2.02}	{2.56}	{2.44}
Crop Growth Cycle (Anc., pre-1500)	-6.12**	0.29	-11.59***	-6.85*	-12.27***	-5.69
	(3.04)	(3.45)	(3.23)	(3.65)	(3.38)	(4.24)
	[2.91]	[3.24]	[3.17]	[2.86]	[3.25]	
	{2.88}	{3.01}	{3.02}	{3.13}	{3.19}	{3.61}
Crop Growth Cycle Change (Anc., post-1500)			0.79	-0.73	0.16	-1.45
			(1.75)	(1.78)	(1.87)	(1.93)
			[1.40]	[1.26]	[1.34]	
			{1.64}	{1.53}	{1.76}	{1.64}
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes
All Geographical Controls & Neolithic	No	Yes	No	Yes	No	Yes
Old World Subsample	No	No	No	No	Yes	Yes
AET		28.48		-8.04		-7.07
δ		12.23		-1.65		-1.46
β^*		7.67		13.95		15.23
R^2	0.58	0.74	0.67	0.78	0.62	0.76
Adjusted-R^2	0.53	0.66	0.62	0.71	0.58	0.67
Observations	87	87	87	87	72	72

Notes: The table shows the robustness of the result in Table 2 to spatial autocorrelation and selection on unobservables. The spatial auto-correlation corrected standard errors based on (Conley, 1999) in the square brackets, and those based on the maximum likelihood estimates suggested by Cliff and Ord (1973, 1981) in the curly brackets. Moreover, it reports the Altonji et al. (2005) AET ratio and the δ and $\beta^*(1,1)$ statistics suggested by Oster (2014). Heteroskedasticity robust standard errors in round parenthesis. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.4 Accounting for Other Pre-Industrial Channels

This section presents further evidence that mitigates potential concerns about the role of alternative pre-industrial channels in the relationship between crop yield and Long-Term-Orientation.

Table B.15 establishes that the persistence of pre-industrial development, as captured by historical levels of population density, urbanization and income per capita, has no qualitative impact of the effect of crop yield on Long-Term Orientation. In particular, it augments the results presented in Table 3 and shows the limited fraction of the variation in Long-Term Orientation that is captured by pre-industrial development (as measured by the partial and semi-partial R^2).

Table B.16 establishes that the results presented in Table 2 are robust to controls for agricultural attributes that were shown to have a persistent effect on cultural attributes: average agricultural suitability (Ramankutty et al., 2002) and the use of the plow (Alesina et al., 2013). Moreover, it establishes that the results are unaffected by accounting for the presence of a linguistic future time reference (FTR), which was shown to be correlated with individual's savings behavior (Chen, 2013).

Table B.17 analyzes the potential confounding effects of pre-industrial trade on the evolution of Long-Term Orientation. The analysis addresses potential concerns that the feasibility of intertemporal trade might have mitigated the importance of long-term orientation in undertaking profitable investment decisions, provided that liquidity constraints were insignificant. The table establishes the robustness of the results in Table 2 to the inclusion of controls for trade potential. In particular, accounting for the effect of variation in agricultural suitability, the existence of a means of exchange, the levels of transportation technologies, and proximity to pre-industrial trade routes (Özak, 2012) does not affect the qualitative results.

Table B.18 explores the potential confounding effects of climatic volatility and its effect on the return to agricultural investment on the evolution of long-term orientation. Moreover, the analysis addresses differential feasibility of diversification within countries, which might have mitigated the adverse effect of climatic volatility on the evolution of long-term orientation. The table establishes the robustness of the results in Table 2 to the potentially confounding effects of climatic volatility and scale. In particular, accounting for area, average monthly standard deviation of precipitation or temperature, as well as spatial autocorrelation with climatic conditions in adjacent cells does not alter the results.

Table B.15: Crop Yield, Growth Cycle, and Long-Term Orientation: Accounting for the Persistence of Pre-Industrial Development

	Long-Term Orientation							
	Population Density		Urbanization				GDP per capita	
	1500CE		1500CE		1800CE		1870CE	1913CE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield (Anc., pre-1500)	11.05***	11.52***	10.01***	11.08***	11.54***	11.54***	14.19***	12.66**
	(2.53)	(2.33)	(3.68)	(3.68)	(3.18)	(3.22)	(5.08)	(5.02)
Crop Yield Change (post-1500)	10.76***	10.40***	8.77**	9.96***	10.05***	10.22***	15.55***	14.92***
	(2.89)	(2.78)	(3.35)	(3.35)	(3.23)	(3.37)	(3.22)	(3.29)
Crop Growth Cycle (Anc., pre-1500)	-8.06*	-10.43***	-5.06	-7.30	-8.60*	-8.75*	-12.58*	-10.28
	(4.06)	(3.63)	(5.28)	(5.37)	(4.68)	(4.84)	(6.44)	(6.46)
Crop Growth Cycle Ch. (post-1500)	-0.46	-1.06	1.06	0.55	0.07	0.03	2.14	3.31
	(1.72)	(1.84)	(2.91)	(2.95)	(2.37)	(2.41)	(3.38)	(3.35)
Population density in 1500 CE		3.76**						
		(1.86)						
Urbanization rate in 1500 CE				1.90				
				(2.24)				
Urbanization rate in 1800 CE						-0.57		
						(1.22)		
GDP per capita 1870							10.57***	
							(3.65)	
GDP per capita 1913								10.99***
								(3.53)
	Partial R^2							
Crop Yield (Anc., pre-1500)	0.23***	0.25***	0.11***	0.12***	0.20***	0.20***	0.25***	0.21**
Crop Yield Change (post-1500)	0.16***	0.16***	0.08**	0.09***	0.12***	0.12***	0.27***	0.26***
Crop Growth Cycle (Anc., pre-1500)	0.06*	0.09***	0.02	0.03	0.06*	0.06*	0.12*	0.09
Crop Growth Cycle Ch. (post-1500)	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02
Population density in 1500 CE		0.05**						
Urbanization rate in 1500 CE				0.01				
Urbanization rate in 1800 CE						0.00		
GDPpc 1870							0.16***	
GDPpc 1913								0.17***
	Semi-Partial R^2							
Crop Yield (Anc., pre-1500)	0.08***	0.09***	0.04***	0.04***	0.07***	0.07***	0.09***	0.07**
Crop Yield Change (post-1500)	0.05***	0.05***	0.03**	0.03***	0.04***	0.04***	0.10***	0.09***
Crop Growth Cycle (Anc., pre-1500)	0.02*	0.03***	0.00	0.01	0.02*	0.02*	0.04*	0.03
Crop Growth Cycle Ch. (post-1500)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Population density in 1500 CE		0.01**						
Urbanization rate in 1500 CE				0.00				
Urbanization rate in 1800 CE						0.00		
GDPpc 1870							0.05***	
GDPpc 1913								0.05***
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.65	0.67	0.60	0.60	0.63	0.62	0.59	0.59
Observations	87	87	65	65	79	79	50	50

Notes: The table establishes that the persistence of pre-industrial development, as captured by historical levels of population density, urbanization and income per capita, has no qualitative impact of the effect of crop yield on Long-Term Orientation. In particular, it augments the results presented in Table 3 and shows the limited fraction of the variation in Long-Term orientation that is captured by pre-industrial development (as measured by the partial and semi-partial R^2). All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.16: Crop Yield, Growth Cycle, and Long-Term Orientation: Accounting for Agriculture, the use of the Plow, and Language Structures

	Long-Term Orientation								
	Agricultural Suitability			Plow			Future Time Reference		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crop Yield (Anc., pre-1500)	10.31***	9.37***	8.12**	11.05***	10.86***	10.68***	10.79***	12.01***	11.79***
	(2.51)	(2.84)	(3.24)	(2.53)	(2.61)	(2.61)	(2.80)	(2.57)	(2.80)
Crop Yield Change (post-1500)	10.41***	10.14***	9.65***	10.76***	10.75***	10.93***	9.93***	9.90***	9.89***
	(2.69)	(2.66)	(2.71)	(2.89)	(2.90)	(2.90)	(3.31)	(2.76)	(3.05)
Crop Growth Cycle (Anc., pre-1500)	-5.73	-5.89	-6.44	-8.06*	-8.19**	-8.74**	-8.19*	-8.03**	-7.84*
	(3.80)	(3.90)	(4.05)	(4.06)	(4.09)	(4.15)	(4.22)	(3.69)	(3.96)
Crop Growth Cycle Change (post-1500)	-0.06	-0.17	-0.42	-0.46	-0.58	-0.88	-0.34	-0.13	-0.22
	(1.59)	(1.67)	(1.73)	(1.72)	(1.72)	(1.69)	(1.75)	(1.79)	(1.77)
Land Suitability		1.38							
		(2.02)							
Land Suitability (Anc.)			3.23						
			(3.45)						
Plow					1.76				
					(3.30)				
Plow (Anc.)						3.89			
						(3.72)			
Strong FTR								-4.42**	
								(1.67)	
Strong FTR (Anc.)									-3.33*
									(1.85)
	Partial R^2								
Crop Yield (Anc., pre-1500)	0.21***	0.13***	0.08**	0.23***	0.22***	0.21***	0.23***	0.28***	0.26***
Crop Yield Change (post-1500)	0.16***	0.15***	0.14***	0.16***	0.16***	0.17***	0.13***	0.15***	0.14***
Crop Growth Cycle (Anc., pre-1500)	0.03	0.03	0.04	0.06*	0.06**	0.07**	0.06*	0.06**	0.06*
Crop Growth Cycle Change (post-1500)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Land Suitability		0.00							
Land Suitability (Anc.)			0.01						
Plow					0.00				
Plow (Anc.)						0.02			
Strong FTR								0.11**	
Strong FTR (Anc.)									0.06*
	Semi-Partial R^2								
Crop Yield (Anc., pre-1500)	0.07***	0.04***	0.02**	0.08***	0.08***	0.07***	0.07***	0.09***	0.08***
Crop Yield Change (post-1500)	0.05***	0.05***	0.04***	0.05***	0.05***	0.06***	0.04***	0.04***	0.04***
Crop Growth Cycle (Anc., pre-1500)	0.01	0.01	0.01	0.02*	0.02**	0.02**	0.02*	0.01**	0.01*
Crop Growth Cycle Change (post-1500)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Land Suitability		0.00							
Land Suitability (Anc.)			0.00						
Plow					0.00				
Plow (Anc.)						0.00			
Strong FTR								0.03**	
Strong FTR (Anc.)									0.02*
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.67	0.67	0.67	0.65	0.65	0.65	0.67	0.70	0.68
Observations	85	85	85	87	87	87	71	71	71

Notes: The table establishes the robustness of the results in Table 2 to controls for average agricultural suitability (Ramankutty et al., 2002), the employment of the plow (Alesina et al., 2013), and the use of future time reference (FTR). Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, and landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.17: Crop Yield, Growth Cycle, and Long-Term Orientation: Accounting for Trade Potential

	Long-Term Orientation								
	Suitability		Money			Transportation			Routes
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crop Yield (Ancestors, pre-1500)	9.00***	9.84***	11.48***	12.03***	11.27***	11.61***	12.37***	11.17***	11.73***
	(2.85)	(2.45)	(2.73)	(3.33)	(2.61)	(2.67)	(3.35)	(2.66)	(2.76)
Crop Yield Change (post-1500)	10.03***	10.84***	11.08***	11.48***	11.11***	10.98***	11.32***	11.13***	11.81***
	(2.97)	(2.72)	(3.16)	(3.42)	(3.09)	(3.16)	(3.17)	(3.14)	(3.42)
Crop Growth Cycle (Ancestors, pre-1500)	-5.35	-7.71*	-8.36*	-8.96*	-8.79**	-8.33*	-9.28**	-8.56*	-9.73**
	(4.23)	(4.29)	(4.28)	(4.66)	(4.38)	(4.30)	(4.61)	(4.42)	(4.51)
Crop Growth Cycle Change (post-1500)	-0.12	0.27	-0.07	-0.02	-0.10	0.02	0.10	-0.34	0.02
	(1.70)	(1.52)	(1.82)	(1.79)	(1.76)	(1.85)	(1.77)	(1.75)	(1.83)
Land Suitability (Gini)	-2.11								
	(2.02)								
Land Suitability (Range)		2.46							
		(1.65)							
Exchange Medium 1000BCE			0.05						
			(2.43)						
Exchange Medium 1CE				1.15					
				(3.12)					
Exchange Medium 1000CE					4.60				
					(4.32)				
Transportation Medium 1000BCE						0.84			
						(3.18)			
Transportation Medium 1CE							2.40		
							(4.36)		
Transportation Medium 1000CE								1.50	
								(4.39)	
Pre-Industrial Distance to Trade Route									0.16
									(5.98)
	Partial R^2								
Crop Yield (Ancestors, pre-1500)	0.13***	0.20***	0.23***	0.22***	0.23***	0.24***	0.22***	0.22***	0.24***
Crop Yield Change (post-1500)	0.15***	0.17***	0.17***	0.17***	0.16***	0.17***	0.18***	0.16***	0.18***
Crop Growth Cycle (Ancestors, pre-1500)	0.03	0.05*	0.07*	0.07*	0.07**	0.07*	0.07**	0.07*	0.09**
Crop Growth Cycle Change (post-1500)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Land Suitability (Gini)	0.01								
Land Suitability (Range)		0.02							
Exchange Medium 1000BCE			0.00						
Exchange Medium 1CE				0.00					
Exchange Medium 1000CE					0.01				
Transportation Medium 1000BCE						0.00			
Transportation Medium 1CE							0.01		
Transportation Medium 1000CE								0.00	
Pre-Industrial Distance to Trade Route									0.00
	Semi-Partial R^2								
Crop Yield (Ancestors, pre-1500)	0.04***	0.06***	0.08***	0.08***	0.09***	0.09***	0.08***	0.08***	0.10***
Crop Yield Change (post-1500)	0.05***	0.05***	0.06***	0.06***	0.06***	0.06***	0.06***	0.06***	0.07***
Crop Growth Cycle (Ancestors, pre-1500)	0.01	0.01*	0.02*	0.02*	0.02**	0.02*	0.02**	0.02*	0.03**
Crop Growth Cycle Change (post-1500)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Land Suitability (Gini)	0.00								
Land Suitability (Range)		0.01							
Exchange Medium 1000BCE			0.00						
Exchange Medium 1CE				0.00					
Exchange Medium 1000CE					0.00				
Transportation Medium 1000BCE						0.00			
Transportation Medium 1CE							0.00		
Transportation Medium 1000CE								0.00	
Pre-Industrial Distance to Trade Route									0.00
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.66	0.67	0.63	0.64	0.63	0.63	0.64	0.62	0.61
Observations	84	84	81	81	81	81	81	81	71

Notes: The table establishes the robustness of the results in Table 2 to the potentially confounding effect of trade potential as captured by: (i) variation in agricultural suitability; (ii) the existence of a mean of exchange; (iii) the levels of transportation technologies; (iv) proximity to pre-industrial trade routes. Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.18: Crop Yield, Growth Cycle, and Long-Term Orientation: Accounting for Risk

	Long-Term Orientation									
	Scale		Risk							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Crop Yield (Ancestors, pre-1500)	10.62***	9.28***	10.88***	11.56***	10.19***	9.58***	11.06***	11.08***	10.98***	11.04***
	(2.62)	(2.49)	(2.68)	(2.70)	(2.97)	(2.81)	(2.58)	(2.62)	(2.58)	(2.64)
Crop Yield Change (post-1500)	10.23***	8.85***	10.75***	10.72***	10.23***	9.85***	10.77***	10.84***	10.74***	10.74***
	(2.95)	(2.93)	(2.92)	(2.88)	(3.00)	(2.93)	(2.92)	(3.14)	(2.92)	(3.12)
Crop Growth Cycle (Ancestors, pre-1500)	-7.45*	-3.79	-8.14*	-7.22*	-6.31	-4.59	-8.07*	-8.16*	-8.02*	-8.05*
	(4.30)	(4.10)	(4.18)	(4.32)	(4.83)	(4.71)	(4.09)	(4.33)	(4.11)	(4.33)
Crop Growth Cycle Change (post-1500)	-0.60	0.15	-0.47	-0.31	-0.12	0.19	-0.46	-0.48	-0.44	-0.45
	(1.68)	(1.65)	(1.73)	(1.75)	(1.87)	(1.82)	(1.75)	(1.78)	(1.74)	(1.77)
Total land area	3.04									
	(2.17)									
Total land area (Ancestors)		7.31***								
		(2.08)								
Precipitation Volatility			0.69							
			(3.05)							
Precipitation Volatility (Ancestors)				-2.26						
				(3.02)						
Temperature Volatility					4.37					
					(6.44)					
Temperature Volatility (Ancestors)						6.70				
						(5.07)				
Precipitation Diversification							-0.22			
							(2.95)			
Precipitation Diversification (Ancestors)								-0.28		
								(2.85)		
Temperature Diversification									0.78	
									(3.05)	
Temperature Diversification (Ancestors)										0.05
										(2.97)
	Partial R^2									
Crop Yield (Ancestors, pre-1500)	0.21***	0.18***	0.21***	0.23***	0.18***	0.16***	0.22***	0.22***	0.22***	0.22***
Crop Yield Change (post-1500)	0.15***	0.13***	0.16***	0.16***	0.15***	0.14***	0.16***	0.16***	0.16***	0.16***
Crop Growth Cycle (Ancestors, pre-1500)	0.05*	0.01	0.06*	0.05*	0.03	0.02	0.06*	0.06*	0.06*	0.06*
Crop Growth Cycle Change (post-1500)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total land area	0.02									
Total land area (Ancestors)		0.14***								
Precipitation Volatility			0.00							
Precipitation Volatility (Ancestors)				0.01						
Temperature Volatility					0.01					
Temperature Volatility (Ancestors)						0.03				
Precipitation Diversification							0.00			
Precipitation Diversification (Ancestors)								0.00		
Temperature Diversification									0.00	
Temperature Diversification (Ancestors)										0.00
	Semi-Partial R^2									
Crop Yield (Ancestors, pre-1500)	0.07***	0.05***	0.07***	0.08***	0.06***	0.05***	0.08***	0.08***	0.08***	0.08***
Crop Yield Change (post-1500)	0.05***	0.04***	0.05***	0.05***	0.05***	0.04***	0.05***	0.05***	0.05***	0.05***
Crop Growth Cycle (Ancestors, pre-1500)	0.02*	0.00	0.02*	0.01*	0.01	0.00	0.02*	0.02*	0.02*	0.02*
Crop Growth Cycle Change (post-1500)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total land area	0.01									
Total land area (Ancestors)		0.04***								
Precipitation Volatility			0.00							
Precipitation Volatility (Ancestors)				0.00						
Temperature Volatility					0.00					
Temperature Volatility (Ancestors)						0.01				
Precipitation Diversification							0.00			
Precipitation Diversification (Ancestors)								0.00		
Temperature Diversification									0.00	
Temperature Diversification (Ancestors)										0.00
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.65	0.70	0.65	0.65	0.65	0.66	0.65	0.65	0.65	0.65
Observations	87	87	87	87	87	87	87	87	87	87

Notes: The table establishes the robustness of the results in Table 2 to the potentially confounding effects of (i) area; (ii) average monthly standard deviation of precipitation or temperature; (iii) spatial autocorrelation with climatic conditions in adjacent cells. Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.5 Robustness to Life Expectancy, Age Dependency Ratio and Income per Capita

Table B.19 explores the potentially confounding effects of the country's age dependency ratio, life-expectancy, and income per capita on long-term orientation. In particular, individuals' age and life expectancy are likely to affect their future orientation and the age composition of the population, as captured partly by the age dependency ratio, may affect the average rate of time preference. Moreover, economic development, as may be captured by the level of income per capita, is associated with the development of institutions such as social security, which may affect long-term orientation. The table establishes that the qualitative results reported in Table 2 are unaffected by of these variables.

Table B.19: Crop Yield, Growth Cycle, and Long-Term Orientation:
Accounting for Life Expectancy, Age Dependency Ratio and Income per Capita

	Long-Term Orientation							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield (pre-1500)	10.76***	10.38***	11.85***	11.44***				
	(3.13)	(3.17)	(3.27)	(3.28)				
Crop Yield Change (post-1500)	9.33***	9.14***	10.02***	9.66***				
	(2.38)	(2.43)	(2.26)	(2.35)				
Crop Growth Cycle (pre-1500)	-5.49	-5.35	-6.00	-5.39				
	(3.77)	(3.86)	(3.72)	(3.78)				
Crop Growth Cycle Change (post-1500)	-1.11	-1.39	-1.12	-1.24				
	(1.96)	(1.77)	(1.90)	(1.88)				
Crop Yield (Anc., pre-1500)					11.31***	11.08***	11.96***	11.67***
					(2.63)	(2.71)	(2.74)	(2.85)
Crop Yield Change (Anc., post-1500)					8.83***	8.64***	9.23***	8.90***
					(1.98)	(2.13)	(1.88)	(1.98)
Crop Growth Cycle (Anc., pre-1500)					-6.85*	-6.75*	-7.30**	-6.79*
					(3.46)	(3.54)	(3.40)	(3.47)
Crop Growth Cycle Change (Anc., post-1500)					-0.73	-0.88	-0.77	-0.80
					(1.61)	(1.50)	(1.58)	(1.58)
Age Dependency Ratio		-2.70				-1.43		
		(3.14)				(3.03)		
Life Expectancy at Birth			5.02				3.83	
			(3.85)				(3.81)	
Ln[GPD per capita]				2.04				1.21
				(2.71)				(2.64)
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All Geographical Controls & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.69	0.69	0.69	0.69	0.71	0.71	0.71	0.71
Observations	87	87	87	87	87	87	87	87

Notes: The table establishes the robustness of the results in Table 2 to the potentially confounding effects of (i) life expectancy at birth; (ii) the age dependency ratio; (iii) income per capita. Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, mean precipitation and temperature, percentages of land in tropical, subtropical and temperate zones, landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.6 Accounting for Income Inequality

This section explores the potentially confounding effect of the degree of inequality , on long-term orientation, capturing the notion that patience may differ across income group. As established in Table B.20, the qualitative results presented in Table 2 are unaffected by various measures in inequality.

Table B.20: Crop Yield, Growth Cycle, and Long-Term Orientation:
Accounting for Income Inequality

	Long-Term Orientation							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield (pre-1500)	10.73***	10.67***	10.47***	10.85***				
	(3.24)	(3.30)	(3.55)	(3.27)				
Crop Yield Change (post-1500)	9.29***	9.21***	9.10***	9.60***				
	(2.47)	(2.45)	(2.50)	(2.60)				
Crop Growth Cycle (pre-1500)	-5.43	-5.37	-5.32	-5.55				
	(4.14)	(4.25)	(4.28)	(4.22)				
Crop Growth Cycle Change (post-1500)	-1.02	-1.00	-0.95	-1.12				
	(2.00)	(1.98)	(1.98)	(1.89)				
Crop Yield (Anc., pre-1500)					11.40***	11.43***	11.31***	11.46***
					(2.77)	(2.79)	(3.09)	(2.78)
Crop Yield Change (Anc., post-1500)					8.85***	8.88***	8.77***	9.04***
					(2.06)	(2.10)	(2.12)	(2.17)
Crop Growth Cycle (Anc., pre-1500)					-6.66*	-6.68*	-6.61*	-6.71*
					(3.70)	(3.77)	(3.80)	(3.71)
Crop Growth Cycle Change (Anc., post-1500)					-0.70	-0.71	-0.67	-0.79
					(1.67)	(1.60)	(1.64)	(1.54)
Net Inequality 2000		-0.42				0.18		
		(3.06)				(2.95)		
Market Inequality 2000			-0.48				-0.19	
			(1.85)				(1.86)	
Average Inequality (80-09)				0.75				0.55
				(3.34)				(3.16)
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All Geographical Controls & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.68	0.68	0.68	0.68	0.70	0.70	0.70	0.70
Observations	84	84	84	84	84	84	84	84

Notes: The table establishes the robustness of the results in Table 2 to the potentially confounding effects of various measures in inequality. Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, mean precipitation and temperature, percentages of land in tropical, subtropical and temperate zones, landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.7 Crop Yield, Population Density and Education

The model suggests that during the Malthusian era one should expect that individuals with higher long-term orientation (at least temporarily) have higher fertility rates. Thus, regions with higher crop yield, and thus higher representation of individuals with higher Long-Term Orientation, should be expected to have higher population density. Reassuringly, Table B.21 demonstrates that indeed higher crop yield is associated with higher population density in the year 1500. However, in the post-Malthusian era when reproductive success is no longer correlated with income, higher crop yield and thus higher Long-Term Orientation would be expected to be correlated with investment in the education of children rather than their number. Indeed, as established in Table B.22 education is positively correlated with crop yield in the contemporary period.

Table B.21: Crop Yield, Growth Cycle, and Population Density in 1500CE

	All World				Old World	
	(1)	(2)	(3)	(4)	(5)	(6)
Crop Yield (pre-1500)	0.50***	0.71***	0.55***	0.42***	0.75***	0.42***
	(0.12)	(0.12)	(0.11)	(0.14)	(0.10)	(0.14)
Crop Growth Cycle (pre-1500)				0.18*		0.22**
				(0.10)		(0.11)
Neolithic Transition Timing			0.60***	0.59***		0.58***
			(0.14)	(0.15)		(0.14)
Continent FE	No	Yes	Yes	Yes	Yes	Yes
Geographical Controls	No	No	Yes	Yes	No	Yes
Adjusted-R^2	0.10	0.47	0.59	0.60	0.40	0.55
Observations	145	145	145	145	124	124

Notes: Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.22: Crop Yield, Growth Cycle, and Education

	Years of Schooling						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crop Yield (Anc., pre-1500)	0.47**	0.71***	0.74***	0.74***	0.75***	0.75***	0.63**
	(0.21)	(0.25)	(0.22)	(0.22)	(0.23)	(0.25)	(0.29)
Crop Yield Change (post-1500)						-0.00	-0.12
						(0.24)	(0.29)
Crop Growth Cycle (Anc., pre-1500)							0.20
							(0.28)
Crop Growth Cycle Change (post-1500)							0.10
							(0.15)
Geographical Controls	No	Yes	Yes	Yes	Yes	Yes	Yes
Continental FE	No	No	Yes	Yes	Yes	Yes	Yes
OPEC FE	No	No	Yes	Yes	Yes	Yes	Yes
Timing of Neolithic	No	No	No	No	Yes	Yes	Yes
Adjusted-R^2	0.03	0.60	0.65	0.65	0.65	0.64	0.64
Observations	130	130	130	130	130	130	130

Notes: Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.8 Accounting for Alternative Cultural Characteristics

This section establishes that the effect of potential crop yield on Long-Term Orientation does not capture the effect of potential crop yield on a wide range of other cultural characteristics. In particular, Table B.23 establishes the robustness of the results in Table 2 to the inclusion of various cultural traits, whereas Table B.24 demonstrates that Long-Term Orientation is significantly statistically correlated with the measure of Restraint vs. Indulgence, but is uncorrelated with all other cultural characteristics proposed by Hofstede et al. (2010), as well as with with levels of generalized trust.

Table B.23: Crop Yield, Growth Cycle, and Long-Term Orientation:
Accounting for Other (Cultural) Traits

	Long-Term Orientation					
	(1)	(2)	(3)	(4)	(5)	(6)
Crop Yield (Anc., pre-1500)	10.56***	10.59***	11.29**	10.61**	10.07**	9.30*
	(2.35)	(2.85)	(4.55)	(5.14)	(4.47)	(4.66)
Crop Yield Change (Anc., post-1500)	9.86***	9.06***	8.10***	7.73***	7.78***	8.07***
	(2.28)	(2.29)	(2.38)	(2.66)	(2.63)	(2.49)
Crop Growth Cycle (Anc., pre-1500)	-7.31**	-7.62**	-7.03	-6.15	-7.09	-6.74
	(3.59)	(3.57)	(5.24)	(5.55)	(5.82)	(5.15)
Crop Growth Cycle Change (Anc., post-1500)	0.77	1.40	3.85	3.24	2.96	2.75
	(1.60)	(1.59)	(2.72)	(2.70)	(2.82)	(2.62)
Trust		-0.77				
		(2.75)				
Individualism			4.28			
			(3.76)			
Power Distance				-0.63		
				(3.29)		
Masculinity					1.77	
					(3.22)	
Uncertainty Avoidance						2.86
						(3.55)
Neolithic Transition Timing (Anc.)	-4.27*	-4.47*	-5.85*	-5.44*	-5.65*	-5.96*
	(2.23)	(2.39)	(3.09)	(3.07)	(3.10)	(3.30)
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.68	0.67	0.57	0.56	0.56	0.57
Observations	87	85	62	62	62	62

Notes: The table establishes the robustness of the results in Table 2 to the inclusion of various cultural traits. All columns account for continental fied effects, geographical controls, and the timing of transition to agriculture experienced by the country's ancestral populations. Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, and landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.24: Long-Term Orientation and Other Societal Preferences

	Correlation Among Cultural Indices						
	(LTO)	(RVI)	(Trust)	(Ind)	(PDI)	(Coop)	(UAI)
Long-Term Orientation (LTO)	1.00						
Restraint vs. Indulgence (RIV)	0.53***	1.00					
Trust	0.19	-0.07	1.00				
Individualism (Ind)	0.12	-0.18	0.45***	1.00			
Power Distance (PDI)	0.05	0.34**	-0.50***	-0.66***	1.00		
Cooperation	0.01	-0.09	-0.21	0.05	0.16	1.00	
Uncertainty Avoidance (UAI)	-0.04	0.07	-0.50***	-0.23	0.27*	-0.00	1.00

Notes: The table shows the correlations between Long-Term Orientation and various measures of societal preferences proposed by Hofstede (1991) and the conventional measure of interpersonal trust based on the World Values Survey. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.8.1 Restraint vs Indulgence

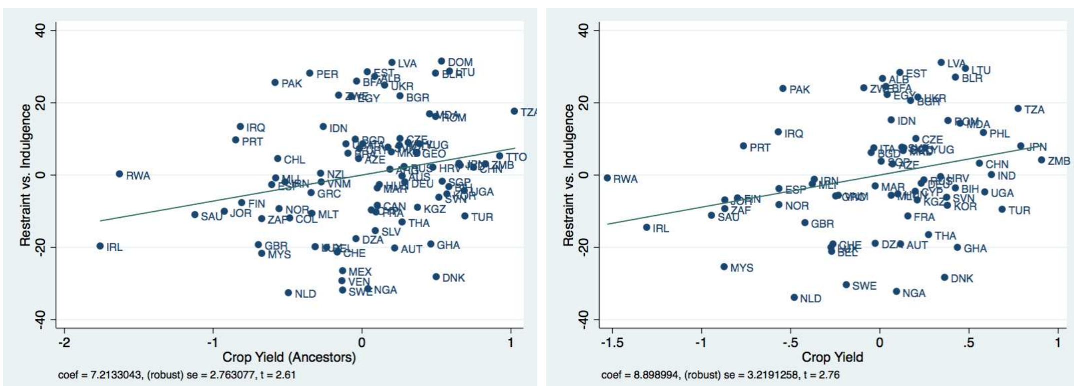
Hofstede (1991) presents a second measure -Restraint vs. Indulgence- that capture some elements of time preference but appear to be partly driven by institutional and religious constraints. Restraint vs. "Indulgence *is characterized by a perception that one can act as one pleases, spend money, and indulge in leisurely and fun-related activities with friends or alone. All this predicts relatively high happiness. At the opposite pole we find a perception that one's actions are restrained by various social norms and prohibitions and a feeling that enjoyment of leisurely activities, spending, and other similar types of indulgence are somewhat wrong.*" (Hofstede et al., 2010, p.281) Hence, the analysis focuses on Long-Term Orientation rather than on Restraint vs. Indulgence (RIV).

Table B.25 establishes that if Restraint vs. Indulgence is used as the dependent variable, the results are similar although somewhat weaker to those obtain in Table 1, reflecting the noisiness of RIV as a measure of future orientation. Moreover, B.4 depicts the partial correlation between crop yield and RIV for the specifications in columns (6) and (8).

Table B.25: Crop Yield, Growth Cycle, and Restraints vs. Indulgence

	Restraints vs. Indulgence							
	Whole World						Old World	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield	6.16***	7.95***	8.26***	7.66**			9.28***	8.90***
	(1.78)	(1.80)	(1.77)	(2.90)			(1.86)	(3.22)
Crop Growth Cycle				1.05				0.60
				(4.07)				(4.46)
Crop Yield (Ancestors)					7.38***	7.21**		
					(1.71)	(2.76)		
Crop Growth Cycle (Ancestors)						0.30		
						(4.22)		
Absolute latitude		0.83	1.40	1.67	3.00	3.06	0.97	1.12
		(3.16)	(3.19)	(3.13)	(3.40)	(3.30)	(3.60)	(3.49)
Mean elevation		0.37	-0.18	-0.39	-0.60	-0.64	-2.39	-2.46
		(2.96)	(3.13)	(3.18)	(3.12)	(3.16)	(2.87)	(2.90)
Terrain Roughness		-2.35	-2.55	-2.54	-2.53	-2.53	-2.49	-2.50
		(2.15)	(2.18)	(2.18)	(2.26)	(2.27)	(2.25)	(2.26)
Neolithic Transition Timing			2.89	2.72			3.79	3.69
			(3.38)	(3.29)			(3.39)	(3.34)
Neolithic Transition Timing (Ancestors)					2.58	2.54		
					(2.70)	(2.66)		
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Geographical Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Old World Sample	No	No	No	No	No	No	Yes	Yes
Adjusted-R^2	0.37	0.42	0.41	0.41	0.39	0.38	0.23	0.22
Observations	86	86	86	86	86	86	71	71

Notes: The table establishes that the results obtained in Table 1 is robust to the use of Restraint vs. Indulgence rather than Long-Term Orientation as the dependent variable. Additional geographical controls include distance to coast or river, and landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on a country's restraint vs. indulgence measure. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.



(a) Ancestry adjusted (b) Old World

Figure B.4: Crop Yield and Restraint vs. Indulgence

B.9 Other Robustness Tests for the Country-Level Analysis

B.9.1 Alternative Measure of Long-Term Orientation

Table B.26 establishes the robustness of the results in Tables 1, 2, and B.9 to the use of an alternative country-level measure of Long-Term Orientation based on the World Value Survey.

Table B.26: Crop Yield, Growth Cycle, and Long-Term Orientation:
Robustness to the Use of an Alternative Measure of LTO

	Whole World				Old World			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield	9.04**				13.74***			
	(3.90)				(4.63)			
Crop Growth Cycle	-2.23				-3.39			
	(4.44)				(4.40)			
Crop Yield (Anc.)		11.05***				12.12***		
		(4.00)				(4.48)		
Crop Growth Cycle (Anc.)		-3.16				-3.50		
		(4.31)				(4.46)		
Crop Yield (Anc., pre-1500)			7.74**				9.33**	
			(3.62)				(3.99)	
Crop Yield Change (Anc., post-1500)			9.00**				9.04**	
			(3.47)				(4.35)	
Crop Growth Cycle (Anc., pre-1500)			-4.32				-5.04	
			(4.64)				(5.33)	
Crop Growth Cycle Change (Anc., post-1500)			-1.17				-1.00	
			(2.52)				(2.51)	
Crop Yield (Anc., pre-1500)				6.88**				8.16**
				(3.19)				(3.53)
Crop Yield Change (Anc., post-1500)				6.48**				7.08*
				(3.24)				(3.63)
Crop Growth Cycle (Anc., pre-1500)				-3.00				-3.56
				(3.59)				(3.98)
Crop Growth Cycle Change (Anc., post-1500)				0.94				1.45
				(2.73)				(2.78)
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All Geographical Controls & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.25	0.27	0.26	0.26	0.22	0.21	0.19	0.19
Observations	91	91	91	91	74	74	74	74

Notes: The table establishes the robustness of the results in Tables 1, 2, and B.9 to the use of an alternative country-level measure of Long-Term Orientation based on the World Value Survey. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.9.2 Inclusion of Cells with Zero Caloric Yield

Table B.27 establishes the robustness of the results in Table 1 to the inclusion of cells with zero potential caloric yield. Since ancestral populations were unlikely to inhabit locations where crop yields were zero, the inclusion of these cells generates measurement errors that bias the estimate downward.

Table B.27: Crop Yield, Crop Growth Cycle, and Long-Term Orientation: Robustness to the Inclusion of Grids with Zero Caloric Yield

	Long-Term Orientation							
	Whole World						Old World	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield	5.26**	9.01***	8.21***	7.11**			11.59***	10.79***
	(2.43)	(2.86)	(2.61)	(3.06)			(2.84)	(3.51)
Crop Growth Cycle				2.18				1.47
				(4.00)				(4.25)
Crop Yield (Ancestors)					9.38***	8.62***		
					(2.43)	(3.11)		
Crop Growth Cycle (Ancestors)						1.52		
						(4.23)		
Absolute Latitude		3.56	2.46	3.01	3.66	4.05	4.98	5.37
		(4.21)	(3.94)	(4.35)	(3.79)	(4.16)	(4.62)	(5.14)
Mean Elevation		6.20*	7.14**	6.63*	6.73**	6.44*	5.86	5.64
		(3.26)	(3.41)	(3.44)	(3.35)	(3.25)	(3.92)	(3.84)
Terrain Roughness		-6.76**	-6.16**	-6.09**	-7.29**	-7.24**	-6.55**	-6.59**
		(2.68)	(2.95)	(2.98)	(3.00)	(3.00)	(3.25)	(3.28)
Neolithic Transition Timing			-6.81**	-7.21**			-5.58*	-5.84*
			(3.05)	(3.20)			(2.84)	(2.94)
Neolithic Transition Timing (Ancestors)					-5.20**	-5.41**		
					(2.53)	(2.63)		
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Geographical Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Old World Sample	No	No	No	No	No	No	Yes	Yes
Adjusted-R^2	0.50	0.57	0.60	0.59	0.60	0.60	0.56	0.56
Observations	87	87	87	87	87	87	72	72

Notes: The Table establishes the robustness of the results in table 1 to the Inclusion of Grids with Zero Caloric Yield in the country's measures of calories per hectare per year. Additional geographical controls include distance to coast or river, and landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.9.3 Religious Composition and Exclusion of Africa

Table B.28 establishes the robustness of the results to the inclusion of the share of population of each major religious denomination in a country, to splitting the sample between Muslim and Non-Muslim countries, and to the exclusion of Africa or Sub-Saharan Africa.

Table B.28: Crop Yield, Growth Cycle, and Long-Term Orientation:
Robustness to the Religious Composition and the Exclusion of Africa

	Long-Term Orientation					
	Religion Shares		Muslim - Non-Muslim		Excluding Africa	
	(1)	(2)	(3)	(4)	(5)	(6)
Crop Yield (Ancestors)	13.31***	10.76***	9.29**	12.09*	14.62***	14.70***
	(2.94)	(3.11)	(3.77)	(6.60)	(3.74)	(3.67)
Crop Growth Cycle (Ancestors)	-3.15	-2.58	-1.39	-6.33	-4.00	-4.71
	(3.52)	(3.43)	(3.26)	(6.79)	(5.15)	(4.86)
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes
Religious Shares	No	Yes	Yes	Yes	No	No
Only Sub-Saharan Excluded	No	No	No	No	No	Yes
Adjusted-R^2	0.66	0.67	0.67	0.64	0.60	0.63
Observations	87	87	49	38	74	77

Notes: The Table establishes the robustness of the results in table 1 to the Religious Composition of each country and to the Exclusion of Africa. Geographical controls include absolute latitude, average elevation above sea level, terrain roughness, distance to coast or river, and landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.10 Potential Crop Yield, Growth Cycle and the Prevalent Mode of Production

Table B.29: Crop Yield, Growth Cycle, and Subsistence across Ethnic Groups

	Subsistence Dependence on								
	Agriculture					Gathering	Hunting	Fishing	Animal Husbandry
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crop Yield (pre-1500)	0.17*	0.26***	0.29***	0.23***	0.19***	-0.15*	-0.01	-0.11***	-0.06
	(0.10)	(0.08)	(0.07)	(0.06)	(0.06)	(0.08)	(0.04)	(0.04)	(0.08)
Crop Yield Ch. (post-1500)			0.23***	0.12***	0.09**	0.03	-0.04	0.10	-0.20***
			(0.05)	(0.05)	(0.04)	(0.05)	(0.05)	(0.06)	(0.07)
Crop Cycle (pre-1500)					0.02	0.06	0.01	-0.08	-0.02
					(0.05)	(0.07)	(0.05)	(0.06)	(0.05)
Crop Growth Cycle Ch. (post-1500)					-0.11*	0.04	-0.04	-0.01	0.16*
					(0.06)	(0.04)	(0.03)	(0.05)	(0.09)
Continental FE	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.03	0.41	0.44	0.49	0.50	0.43	0.50	0.47	0.52
Observations	1193	1193	1193	1193	1193	1193	1193	1193	1193

Notes: The table establishes that pre-1500 potential crop yield and its change is positively associated with the use agricultural as the main subsistence mode. Geographical controls include absolute latitude, area of ethnic homeland, mean elevation, mean precipitation and temperature levels, terrain ruggedness, share of land within 100km of sea, length of coastline, and malaria ecology. Standardized coefficients. Heteroskedasticity robust standard error estimates clustered at the language genus level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.30: Crop Yield, Growth Cycle, and Agricultural Intensity across Ethnic Groups

	Intensive Agriculture				
	(1)	(2)	(3)	(4)	(5)
Crop Yield (pre-1500)	0.33***	0.34***	0.33***	0.31***	0.26***
	(0.12)	(0.08)	(0.07)	(0.08)	(0.07)
Crop Yield Ch. (post-1500)			-0.01	-0.02	-0.06
			(0.06)	(0.04)	(0.04)
Crop Cycle (pre-1500)					0.03
					(0.06)
Crop Growth Cycle Ch. (post-1500)					-0.12***
					(0.04)
Continental FE	No	Yes	Yes	Yes	Yes
Geographical Controls	No	No	No	Yes	Yes
Adjusted-R^2	0.11	0.48	0.48	0.50	0.51
Observations	1153	1153	1153	1153	1153

Notes: The table establishes the positive association between pre-1500 potential crop yield and agricultural intensity. Geographical controls include absolute latitude, area of ethnic homeland, mean elevation, mean precipitation and temperature levels, terrain ruggedness, share of land within 100km of sea, length of coastline, and malaria ecology. Standardized coefficients. Heteroskedasticity robust standard error estimates clustered at the language genus level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.31: Crop Yield, Growth Cycle, and Subsistence on Agriculture

	Agriculture Contributes Most to Subsistence				
	(1)	(2)	(3)	(4)	(5)
Crop Yield (pre-1500)	0.17*	0.25***	0.29***	0.23***	0.19***
	(0.10)	(0.08)	(0.07)	(0.07)	(0.06)
Crop Yield Ch. (post-1500)			0.27***	0.16***	0.12**
			(0.07)	(0.06)	(0.05)
Crop Cycle (pre-1500)					0.03
					(0.06)
Crop Growth Cycle Ch. (post-1500)					-0.10
					(0.07)
Continental FE	No	Yes	Yes	Yes	Yes
Geographical Controls	No	No	No	Yes	Yes
Adjusted-R^2	0.03	0.32	0.36	0.39	0.40
Observations	1193	1193	1193	1193	1193

Notes: The table establishes the positive association between pre-1500 potential crop yield and its change and the contribution of agriculture to subsistence. Geographical controls include absolute latitude, area of ethnic homeland, mean elevation, mean precipitation and temperature levels, terrain ruggedness, share of land within 100km of sea, length of coastline, and malaria ecology. Standardized coefficients. Heteroskedasticity robust standard error estimates clustered at the language genus level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.11 Potential Crop Yield and Long-Term Orientation in Second-Generation Migrants

B.11.1 Plausibility of the ESS Measure of Long-Term Orientation

This subsection establishes that the measure of Long-Term Orientation derived from the ESS is indeed a plausible one, as reflected by its positive association with education and income (Tables B.32 and B.33).

Table B.32: Long-Term Orientation and Education of Second Generation Migrants

	Years of Schooling							
	Second-Generation Migrants				All Individuals			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Long-Term Orientation	0.35***	0.37***	0.36**	0.32**	0.79***	0.88***	0.70***	0.63***
	(0.13)	(0.14)	(0.14)	(0.13)	(0.05)	(0.05)	(0.05)	(0.04)
Country FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Sex & Age	No	No	Yes	Yes	No	No	Yes	Yes
Pray & Health	No	No	No	Yes	No	No	No	Yes
Adjusted-R^2	0.01	0.10	0.10	0.11	0.04	0.15	0.19	0.21
R^2	0.01	0.13	0.13	0.16	0.04	0.15	0.20	0.21
Observations	705	705	705	705	42016	42016	42016	42016

Notes: The table establishes the positive correlation between Long-Term Orientation and individual education levels for respondents in the third wave of the European Social Survey. Long-term orientation is measured on a scale of 0 to 100 by the answer to the question "Do you generally plan for your future or do you just take each day as it comes?". The data is taken from the third wave of the European Social Survey (2006). All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on Long-Term Orientation. Heteroskedasticity robust clustered standard error estimates are reported in parentheses; clustering at the country of origin level; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.11.2 Alternative Estimation Method: Ordered Probit

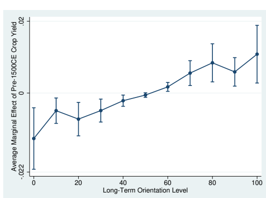
This section establishes that the effect of crop yield on Long-Term Orientation among second-generation migrants is robust for the estimation methodology. In particular, Table B.34 establishes that the qualitative results derived in Table 5 remains intact if ordered probit is employed.

Figure B.5 depicts the estimated average marginal effects of crop yield on Long-Term Orientation, capturing the change in the probability of observing each level of Long-Term Orientation due to a one standard deviation increase in pre-1500CE crop yield. Each figure depicts Long-Term Orientation on the horizontal axis and the average marginal effect of crop yield with its 95% confidence interval on the vertical axis. As depicted, the average marginal effect of crop yield is negative for low values of Long-Term Orientation and it increases monotonically and becomes positive for high values of Long-Term Orientation. Thus, increasing crop yield increases the probability of observing higher values of Long-Term Orientation (i.e., as crop yield increases, the probability distribution of Long-Term Orientation shifts rightwards).

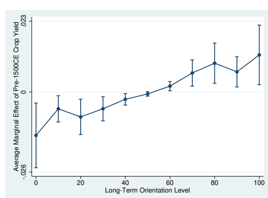
Table B.33: Long-Term Orientation and Income of Second Generation Migrants

	Total Household Income							
	Second-Generation Migrants				All Individuals			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Long-Term Orientation	0.33**	0.22*	0.22**	0.23**	0.35***	0.45***	0.36***	0.32***
	(0.14)	(0.12)	(0.10)	(0.11)	(0.08)	(0.04)	(0.04)	(0.04)
Country FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Sex & Age	No	No	Yes	Yes	No	No	Yes	Yes
Pray & Health	No	No	No	Yes	No	No	No	Yes
Adjusted-R^2	0.01	0.40	0.40	0.41	0.01	0.50	0.52	0.53
R^2	0.01	0.43	0.43	0.47	0.01	0.50	0.52	0.53
Observations	383	383	383	383	29323	29323	29323	29323

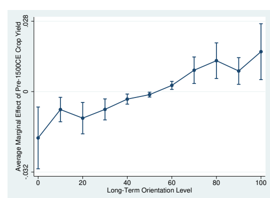
Notes: The table establishes the positive correlation between Long-Term Orientation and individual income levels for respondents in the third wave of the European Social Survey. Long-term orientation is measured on a scale of 0 to 100 by the answer to the question "Do you generally plan for your future or do you just take each day as it comes?". The data is taken from the third wave of the European Social Survey (2006). All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on Long-Term Orientation. Heteroskedasticity robust clustered standard error estimates are reported in parentheses; clustering at the country of origin level; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.



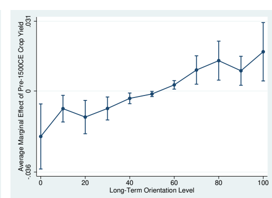
(a) Column (1)



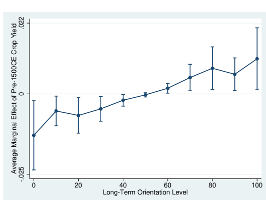
(b) Column (2)



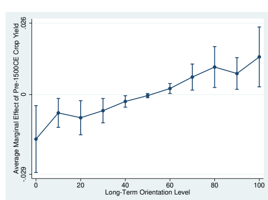
(c) Column (3)



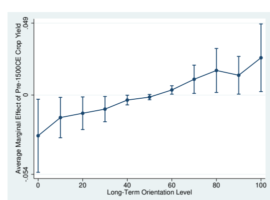
(d) Column (4)



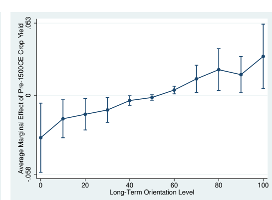
(e) Column (5)



(f) Column (6)



(g) Column (7)



(h) Column (8)

Figure B.5: Average Marginal Effects of Pre-1500CE Crop Yield on Long-Term Orientation of Second-Generation Migrants

B.11.3 Accounting for Various Weighting Schemes

As established in Table B.35, the results presented in Table 5 are robust to the use of various weighting schemes: (i) survey design weights; (ii) weights that ensure an equal share of migrants of each country of origin within each host country; (iii) weights that ensure an equal share of migrants (regardless of their origins) within each host country; weights that ensure an equal share of migrants of each country of origin across all host countries. To facilitate the construction of these (non-survey based) weighting schemes, the analysis is inevitably restricted to second-generation migrants whose

Table B.34: Crop Yield and Long-Term Orientation of Second-Generation Migrants: Ordered Probit

	Long-Term Orientation							
	Either Parent		Mother		Father		Both	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield (Ancestors, pre-1500)	0.09***	0.09***	0.12***	0.14***	0.08**	0.11***	0.19**	0.21**
	(0.03)	(0.04)	(0.04)	(0.05)	(0.04)	(0.04)	(0.08)	(0.08)
Crop Yield Change (post-1500)	0.02	0.02	0.01	0.03	0.02	0.02	0.06	0.08
	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)	(0.05)
Crop Growth Cycle (Ancestors, pre-1500)		-0.02		-0.04		-0.06		-0.09
		(0.03)		(0.05)		(0.05)		(0.09)
Crop Growth Cycle Change (post-1500)		-0.01		-0.04		0.02		-0.01
		(0.02)		(0.02)		(0.03)		(0.04)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls& Neolithic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo-R^2	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03
Observations	2584	2584	1596	1596	1686	1686	568	568

Notes: Heteroskedasticity robust standard error estimates clustered at the country of origin of parents level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

parents are both migrants.

B.11.4 Crop Yield, Long-Term Orientation and Education

This subsection further explores the relationship between crop yield, Long-Term Orientation and economic behavior. It examines the effect of crop yield on tertiary education of second-generation migrants.[35]. In particular, as established in Table B.36, crop yield in the pre-1500CE era has a positive effect on the likelihood of obtaining at least some tertiary education. Moreover, it suggests that the effect is partially mediated by long-term orientation.

[35]For comparability the analysis is performed on the only wave of the ESS for which data on saving and Long-Term Orientation is available. The effect of crop yield on tertiary education is fragile in other surveys of the ESS

Table B.35: Crop Yield and Long-Term Orientation of Second-Generation Migrants: Accounting for Various Weighting Schemes

	Long-Term Orientation (weighted OLS)											
	All crops				All cells				Changing cells/crops			
	(Survey)	(N_c)	(N)	(N_m)	(Survey)	(N_c)	(N)	(N_m)	(Survey)	(N_c)	(N)	(N_m)
Crop Yield (Ancestors)	7.10***	15.24***	12.16***	9.29***								
	(2.48)	(3.25)	(2.83)	(3.42)								
Crop Growth Cycle (Anc.)	-4.72*	1.46	0.05	4.58								
	(2.43)	(3.78)	(3.25)	(4.43)								
Crop Yield (Anc., pre-1500)					7.03***	15.24***	12.29***	11.88***				
					(2.39)	(2.54)	(2.21)	(2.86)				
Crop Yield Change (post-1500)					0.87	0.50	0.33	-1.75				
					(1.55)	(2.61)	(2.20)	(1.94)				
Crop Growth Cycle (Anc., pre-1500)					-3.28	2.98	1.61	4.23				
					(2.77)	(4.25)	(3.90)	(4.93)				
Crop Growth Cycle Ch. (post-1500)					-1.70*	1.11	-0.04	1.34				
					(0.98)	(1.69)	(1.41)	(1.39)				
Crop Yield (Anc., pre-1500)									6.38***	9.39***	8.18***	8.25***
									(1.97)	(2.68)	(2.25)	(2.24)
Crop Yield Change (post-1500)									-1.46	0.92	0.38	-0.73
									(1.66)	(2.74)	(2.43)	(2.27)
Crop Growth Cycle (Anc., pre-1500)									-0.96	1.26	1.32	-0.45
									(2.27)	(2.49)	(2.31)	(2.45)
Crop Growth Cycle Ch. (post-1500)									2.49	0.78	-0.70	-2.60
									(1.59)	(1.97)	(1.95)	(1.95)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sex & Age	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Education & Marital Status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pray & Health	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.05	0.20	0.23	0.27	0.05	0.21	0.24	0.28	0.05	0.17	0.22	0.27
R^2	0.13	0.26	0.29	0.32	0.13	0.27	0.30	0.34	0.13	0.24	0.28	0.33
Observations	705	705	705	705	705	705	705	705	705	705	705	705

Notes: The table establishes the robust of the results in Table 5 to various weighting schemes: (i) survey design weights (Survey); (ii) weights that ensure an equal share of migrants of each country of origin within each host country (N_c); (iii) weights that ensure an equal share of migrants (regardless of their origins) within each host country (N); weights that ensure an equal share of migrants of each country of origin across all host countries (N_m). Crop yield, crop growth cycle, and all other geographical controls reflect these attributes in the mother's country of origin. Heteroskedasticity robust clustered standard error estimates are reported in parentheses; clustering at the region of interview and individual characteristics level; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.36: Crop Yield and Tertiary Education of Second-Generation Migrants

	Tertiary Education							
	Either Parent		Mother		Father		Both	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield (Ancestors, pre-1500)	0.06**	0.04*	0.05	0.04	0.08**	0.06**	0.12**	0.11*
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.05)	(0.05)
Crop Yield Change (post-1500)	0.02	0.01	0.01	0.01	0.02	0.01	0.01	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.03)	(0.04)
Crop Growth Cycle (Ancestors, pre-1500)	-0.08***	-0.07**	-0.08**	-0.07*	-0.12***	-0.10***	-0.18***	-0.16**
	(0.03)	(0.03)	(0.03)	(0.04)	(0.03)	(0.03)	(0.06)	(0.06)
Crop Growth Cycle Change (post-1500)	-0.02**	-0.02**	-0.04***	-0.04***	-0.02	-0.02	-0.03	-0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.03)	(0.03)
Long-Term Orientation		0.02		0.01		0.03**		0.03
		(0.02)		(0.02)		(0.02)		(0.04)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geography & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.11	0.11	0.11	0.11	0.11	0.11	0.09	0.09
Observations	2376	2376	1464	1464	1532	1532	521	521

Notes: Heteroskedasticity robust standard error estimates clustered at the country of origin of parents level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.12 Potential Crop Yield, Growth Cycle, and Long-Term Orientation: World Values Survey

B.12.1 Alternative Estimation Method: Probit

This section establishes that the effect of crop yield on Long-Term Orientation is robust to the estimation methodology. In particular, Table B.37 establishes that the qualitative results derived in Table 8 remain intact if probit is employed.

B.12.2 Accounting for Various Weighting Schemes

As established in Table B.38, the results presented in Table 8 are robust to the use of various weighting schemes: (i) unweighted OLS; (ii) survey design weights; (iii) an equal weight for each country; (iv) weights that reflect differences in population across countries.

B.12.3 Accounting for Country Fixed-Effects

This subsection explores the effect of crop yield on Long-Term Orientation across individuals within each region of a given country, accounting for country fixed-effects (Table B.39). Furthermore, it examines the effect of crop yield and its change on the share of individuals within each region that are characterized by Long-Term Orientation, accounting for various weighting schemes (Table B.40).

Table B.37: Crop Yield, Growth Cycle, and Long-Term Orientation (WVS Country Analysis)

	Long-Term Orientation (Probit)							
	Whole World							Old World
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield (pre-1500)	0.025***	0.040***	0.036***	0.032***	0.032***	0.031***		0.066***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)		(0.003)
Crop Yield Change (post-1500)					0.051***	0.053***		0.054***
					(0.002)	(0.002)		(0.003)
Crop Growth Cycle (pre-1500)						-0.008***		-0.018***
						(0.003)		(0.003)
Crop Growth Cycle Change (post-1500)						0.025***		0.026***
						(0.002)		(0.002)
Crop Yield (Ancestors, pre-1500)							0.042***	
							(0.002)	
Crop Yield Change (Anc., post-1500)							0.040***	
							(0.002)	
Crop Growth Cycle (Ancestors, pre-1500)							-0.005*	
							(0.003)	
Crop Growth Cycle Change (Anc., post-1500)							0.018***	
							(0.002)	
Wave FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls & Neolithic	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	No	No	No	Yes	Yes	Yes	Yes	Yes
Old World Subsample	No	No	No	No	No	No	No	Yes
Pseudo-R^2	0.01	0.02	0.02	0.03	0.03	0.03	0.03	0.04
Observations	217953	217953	217953	217953	217953	217953	217953	176489

Notes: The table establishes the positive, statistically, and economically significant effect of potential crop yield on the probability an individual has Long-Term Orientation. Shown are the average marginal effects of probit regressions. Individuals have Long-Term Orientation if they consider thrift as an especially important child quality in the World Values Survey. All columns include fixed effects for the wave the interview was conducted. Potential crop yield, potential crop growth cycle, and all other geographical controls refer to the country where the interview was conducted. Additional geographical controls include distance to coast or river, and landlocked and island dummies. Individual Characteristics include age, sex, education, and income. Columns (1)-(7) show the results for the whole world sample, while column (8) shows the results for the Old World sample. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on Long-Term Orientation. Heteroskedasticity robust clustered standard error estimates are reported in parentheses; clustering at the region of interview and individual characteristics level; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.38: Crop Yield, Growth Cycle, and Long-Term Orientation:
Accounting for Various Weighting Schemes

	Long-Term Orientation (Weighted OLS)											
	All crops				All cells				Changing cells/crops			
	(No)	(Survey)	(Same N)	(Pop)	(No)	(Survey)	(Same N)	(Pop)	(No)	(Survey)	(Same N)	(Pop)
Crop Yield (Ancestors)	0.048***	0.047***	0.056***	0.027***								
	(0.003)	(0.003)	(0.003)	(0.008)								
Crop Growth Cycle (Ancestors)	0.017***	0.018***	0.010***	0.033***								
	(0.003)	(0.003)	(0.003)	(0.007)								
Crop Yield (Ancestors, pre-1500)					0.046***	0.044***	0.048***	0.024***				
					(0.002)	(0.002)	(0.002)	(0.006)				
Crop Growth Cycle (Ancestors, pre-1500)					-0.012***	-0.010***	-0.019***	0.009				
					(0.003)	(0.003)	(0.003)	(0.007)				
Crop Yield Change (post-1500)					0.052***	0.051***	0.062***	0.023***				
					(0.003)	(0.003)	(0.003)	(0.009)				
Crop Growth Cycle Change (post-1500)					0.021***	0.020***	0.014***	0.027***				
					(0.002)	(0.002)	(0.002)	(0.005)				
Crop Yield (Ancestors, pre-1500)									0.033***	0.032***	0.028***	0.035***
									(0.002)	(0.002)	(0.002)	(0.005)
Crop Growth Cycle (Ancestors, pre-1500)									0.010***	0.016***	0.014***	0.013
									(0.002)	(0.002)	(0.002)	(0.008)
Crop Yield Change (post-1500)									0.032***	0.031***	0.041***	0.014***
									(0.002)	(0.002)	(0.002)	(0.005)
Crop Growth Cycle Change (post-1500)									-0.006***	-0.005***	-0.007***	-0.009
									(0.001)	(0.001)	(0.001)	(0.008)
Wave FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Chars	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.04	0.05	0.05	0.09	0.05	0.05	0.05	0.09	0.04	0.05	0.05	0.09
Adjusted-R^2	0.04	0.05	0.05	0.09	0.05	0.05	0.05	0.09	0.04	0.05	0.05	0.09
Observations	217953	217953	217953	217953	217953	217953	217953	217953	217953	217953	217953	217953

Notes: The table establishes the robustness of results in Table 8 to various weighting schemes: (i) unweighted OLS (No); (ii) survey design weights (Survey); (iii) an equal weight for each country (Same N); (iv) weights that reflect differences in population across countries (Pop). All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on Long-Term Orientation. Heteroskedasticity robust clustered standard error estimates are reported in parentheses; clustering at the region of interview and individual characteristics level; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.39: Crop Yield, Growth Cycle, and Long-Term Orientation:
WVS Regional Analysis

	Long-Term Orientation (OLS)							
	Whole World						Old World	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield (pre-1500)	0.019***	0.020***	0.019***	0.022***	0.027***	0.003	0.054***	0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.004)
Crop Yield Change (post-1500)				0.044***	0.049***	0.006**	0.045***	0.007**
				(0.002)	(0.002)	(0.003)	(0.002)	(0.003)
Crop Growth Cycle (pre-1500)					-0.018***	-0.010**	-0.013***	-0.008
					(0.003)	(0.004)	(0.004)	(0.005)
Crop Growth Cycle Change (post-1500)					0.001	-0.007***	0.003	-0.006**
					(0.002)	(0.002)	(0.002)	(0.003)
Wave FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Continent FE	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Geographical Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Chars	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	No	No	No	No	No	Yes	No	Yes
Old World Subsample	No	No	No	No	No	No	Yes	Yes
Adjusted-R^2	0.02	0.03	0.04	0.05	0.05	0.09	0.05	0.09
Observations	190327	190327	190327	190327	190327	190327	151342	151342

Notes: The table establishes the positive, statistically, and economically significant effect of potential crop yield on the probability an individual has Long-Term Orientation across regions, accounting of country fixed effects. Geographical controls include absolute latitude, elevation above sea level, terrain roughness, percentage of land within 100 km of sea, landlocked dummy, and area suitable for agriculture. Individual Characteristics include age, sex, education, and income. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on Long-Term Orientation. Heteroskedasticity robust clustered standard error estimates are reported in parentheses; clustering at the region of interview and individual characteristics level; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.40: Crop Yield, Growth Cycle, and Long-Term Orientation in WVS Regions

	Share of Individuals in WVS Region with Long-Term Orientation											
	Whole World										Old World	
	Unweighted				Weighted: Area				Weighted: Area Share		Area	Share
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Crop Yield (pre-1500)	0.033***	0.032***	0.040***		0.074***		0.019		0.017**		0.027	0.019*
	(0.010)	(0.010)	(0.014)		(0.027)		(0.013)		(0.008)		(0.019)	(0.010)
Crop Yield Change (post-1500)	0.055***	0.049***	0.054***		0.079***		0.001		0.012**		0.001	0.012**
	(0.013)	(0.014)	(0.016)		(0.028)		(0.010)		(0.005)		(0.010)	(0.005)
Crop Growth Cycle (pre-1500)			-0.012		-0.038*		-0.014		-0.026***		-0.018*	-0.027***
			(0.013)		(0.020)		(0.008)		(0.005)		(0.009)	(0.006)
Crop Growth Cycle Change (post-1500)			-0.004		-0.031***		-0.026***		-0.028***		-0.026***	-0.027***
			(0.008)		(0.007)		(0.007)		(0.002)		(0.008)	(0.002)
Crop Yield (Anc., pre-1500)				0.056***		0.109***		0.022		0.019**		
				(0.017)		(0.036)		(0.018)		(0.009)		
Crop Yield Change (Anc., post-1500)				0.043***		0.060***		-0.000		0.011**		
				(0.013)		(0.017)		(0.010)		(0.005)		
Crop Growth Cycle (Anc., pre-1500)				-0.014		-0.045**		-0.015*		-0.025***		
				(0.013)		(0.019)		(0.008)		(0.005)		
Crop Growth Cycle Change (Anc., post-1500)				-0.001		-0.029***		-0.026***		-0.028***		
				(0.008)		(0.010)		(0.008)		(0.002)		
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Country FE	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Additional Geographical Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Old World Sample	No	No	No	No	No	No	No	No	No	No	Yes	Yes
Weighted by Region Area	No	No	No	No	Yes	Yes	Yes	Yes	No	No	Yes	No
Weighted by Region's Share of Area	No	No	No	No	No	No	No	No	Yes	Yes	No	Yes
Adjusted-R^2	0.24	0.26	0.26	0.29	0.29	0.37	0.72	0.72	0.86	0.86	0.72	0.86
Observations	1356	1356	1356	1356	1356	1356	1356	1356	1356	1356	1143	1143

Notes: The table establishes the positive, statistically, and economically significant effect of potential crop yield on the share of individual's with Long-Term Orientation across regions, accounting of country fixed effects. Additional geographical controls are percentage of land within 100 km of sea, landlocked dummy, and area suitable for agriculture. Columns (1)-(4) show the unweighted results; columns (5)-(8) weight observations according to the region's area; columns (9)-(10) weight observations according to the region's area as a share of the country's area; and columns (11)-(12) conduct the analysis for the Old World Sample. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation increase in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates clustered at the country level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.13 Crop Yield and Technological Adoption

This section further explores the effect of crop yield on technological adoption.

First, it examines the robustness of the results in Table 10 to the inclusion of the potential use of Asian varieties of crops in sub-Saharan Africa (Table B.41).

Second, using the SCCS, the analysis establishes that crop yield in pre-1500CE era and its change in the post-1500 period have a positive and significant effect on the aggregate number of technological changes across ethnic groups (Table B.42 for the 86 ethnicities included in Table 10; Table B.43 for an extended sample of 133 ethnicities).

Third, Figure B.6 depicts that the region of Emilia-Romagna, which is characterized by the highest crop yield among all Italian regions, is the location of production processes that are notorious for their lengthy production cycles: Modena and Reggio Emilia balsamic Vinegar (cycles of 12 and 20 years) and Parmigiano-Reggiano cheese (cycles of 12 to 36 months). The Modena commune is depicted within the white the boundaries of the Modena province, the Reggio Emilia commune within the yellow the boundaries of the Reggio Emilia province, and the Parma commune within the green boundaries of the Parma province.

Table B.41: Crop Yield, Growth Cycle, and Technological Adoption (SCCS)

	Major Technological Changes Industrialization, Factories, etc.					
	(1)	(2)	(3)	(4)	(5)	(6)
Crop Yield (pre-1500)	0.05	0.08*	0.12**	0.05	0.07	0.10
	(0.05)	(0.05)	(0.05)	(0.07)	(0.07)	(0.08)
Crop Yield Ch. (post-1500)			0.06	0.06	0.10*	0.19**
			(0.05)	(0.06)	(0.05)	(0.08)
Crop Cycle (pre-1500)				0.02	0.09	0.05
				(0.07)	(0.07)	(0.10)
Crop Growth Cycle Ch. (post-1500)				-0.10	-0.15***	-0.11*
				(0.06)	(0.05)	(0.06)
Geographical Controls	No	Yes	Yes	Yes	Yes	Yes
Language Family FE	No	No	No	No	Yes	Yes
Continental FE	No	No	No	No	No	Yes
Pseudo-R^2	0.01	0.10	0.11	0.13	0.33	0.36
Observations	86	86	86	86	86	86

Notes: The table establishes the effect of pre-1500CE crop yield, growth cycle, and their changes on technological progress as reflected in the adoption of industrialization, factories, mining, large machinery, etc.. The table reports the average marginal effects of Probit regressions. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable. Geographical controls include absolute latitude, area of ethnic homeland, mean elevation, mean precipitation and temperature levels, terrain ruggedness, share of land within 100km of sea, length of coastline, and malaria ecology. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.14 Correlations between the various Long-Term Orientation Measures

This section shows the correlations between the different Long-Term Orientation measures at the country level. For the ESS and WVS the country-level measure is the average of the individual

Table B.42: Crop Yield, Growth Cycle, and Technological Change (SCCS)

	Sum of Technological Changes (Poisson Regression)					
	(1)	(2)	(3)	(4)	(5)	(6)
Crop Yield (pre-1500)	0.20***	0.25***	0.21**	0.33**	0.36**	0.30**
	(0.08)	(0.09)	(0.09)	(0.14)	(0.14)	(0.13)
Crop Yield Ch. (post-1500)			-0.12	-0.10	-0.19	-0.06
			(0.11)	(0.12)	(0.14)	(0.19)
Crop Cycle (pre-1500)				-0.12	-0.16	-0.22
				(0.14)	(0.16)	(0.16)
Crop Growth Cycle Ch. (post-1500)				0.09	0.26**	0.25*
				(0.10)	(0.12)	(0.13)
Geographical Controls	No	Yes	Yes	Yes	Yes	Yes
Language Family FE	No	No	No	No	Yes	Yes
Continental FE	No	No	No	No	No	Yes
Pseudo-R^2	0.02	0.05	0.05	0.06	0.12	0.13
Observations	86	86	86	86	86	86

Notes: The table establishes the effect of pre-1500CE crop yield, growth cycle, and their changes on the number of technological changes in an ethnicity. Technological changes include introduction of foreign goods (weapons, etc.), minor technological changes (wheels, carts, plough, changes in house construction) and major technological changes (industrialization, factories, mining, large machinery). All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable. Geographical controls include absolute latitude, area of ethnic homeland, mean elevation, mean precipitation and temperature levels, terrain ruggedness, share of land within 100km of sea, length of coastline, and malaria ecology. Heteroskedasticity robust standard error estimates clustered at the language family level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

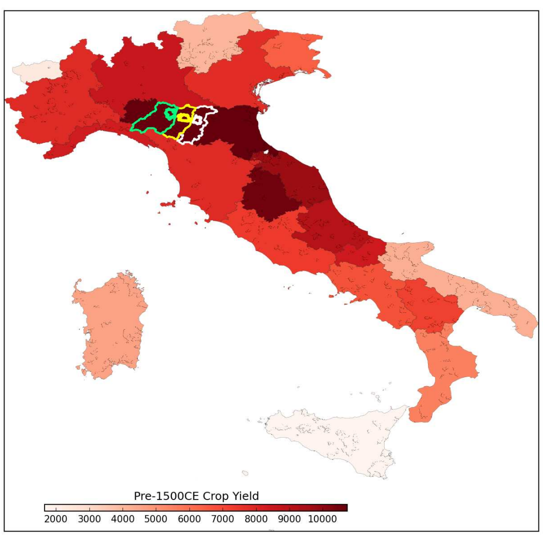


Figure B.6: Crop Yield and the Adoption of Lengthy Production Processes: Aceto Balsamico and Parmigiano Reggiano

responses in the data. As Tables B.44 and B.45 show, the three measures are highly correlated, which suggests they are indeed measuring the same phenomenon.

Table B.43: Crop Yield, Growth Cycle, and Technological Change (SCCS)

	Sum of Technological Changes (Poisson Regression)					
	(1)	(2)	(3)	(4)	(5)	(6)
Crop Yield (pre-1500)	0.11**	0.14**	0.15**	0.18**	0.30**	0.16
	(0.05)	(0.06)	(0.06)	(0.09)	(0.13)	(0.12)
Crop Yield Ch. (post-1500)			0.01	0.03	0.11	0.22**
			(0.08)	(0.08)	(0.08)	(0.10)
Crop Cycle (pre-1500)				-0.11	-0.29**	-0.33**
				(0.10)	(0.14)	(0.14)
Crop Growth Cycle Ch. (post-1500)				-0.11	-0.12	-0.08
				(0.07)	(0.10)	(0.09)
Geographical Controls	No	Yes	Yes	Yes	Yes	Yes
Language Family FE	No	No	No	No	Yes	Yes
Continental FE	No	No	No	No	No	Yes
Pseudo-R^2	0.01	0.03	0.03	0.03	0.13	0.15
Observations	133	133	133	133	133	133

Notes: The table establishes the effect of pre-1500CE crop yield, growth cycle, and their changes on the number of technological changes in an ethnicity. Technological changes include introduction of foreign goods (weapons, etc.), minor technological changes (wheels, carts, plough, changes in house construction) and major technological changes (industrialization, factories, mining, large machinery). All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable. Geographical controls include absolute latitude, area of ethnic homeland, mean elevation, mean precipitation and temperature levels, terrain ruggedness, share of land within 100km of sea, length of coastline, and malaria ecology. Heteroskedasticity robust standard error estimates clustered at the language family level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

C Variable Definitions, Sources and Summary Statistics

C.1 Outcome Variables

C.1.1 Measures of Long-Term Orientation

- **Long-Term Orientation (Country-level analysis)**: Taken from Hofstede et al. (2010) available at `http://www.geerthofstede.nl/dimension-data-matrix`. Accessed on February 17, 2014. Scale between 0 (short term-orientation) and 100 (Long-Term Orientation)

- **Long-Term Orientation (Second-generation analysis)**: Based on the answer to the question "Do you generally plan for your future or do you just take each day as it comes?" taken from the "Timing of Life" module in the third wave of the European Social Survey. Scale between 0 (short term-orientation) and 100 (Long-Term Orientation)

- **Long-Term Orientation (Individual-level analysis)**: Based on the following question taken from the integrated file for waves 1-5 of the WVS: "Here is a list of qualities that children can be encouraged to learn at home. Which, if any, do you consider to be especially important?" An individual is considered to have Long-Term Orientation if she answered "Thrift, saving money and things" as an especially important quality children should learn at home. Coded 1 if individual has LTO, and 0 otherwise.

Table B.44: Correlation of Long-Term Orientation Measures

	Long-Term Orientation Measures	
	Hofstede	WVS
Hofstede	1.00	
WVS	0.58***	1.00
Observations	87	

Notes: The table shows the strong positive correlation between the country level measure of Long-Term Orientation (LTO) from Hofstede and the country level average of the LTO measure from the WVS for the sample in section 4. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.45: Correlation of Long-Term Orientation Measures

	Long-Term Orientation Measures		
	ESS	Hofstede	WVS
ESS	1.00		
Hofstede	0.37*	1.00	
WVS	0.44**	0.59***	1.00
Observations	22		

Notes: The table shows the strong positive correlation between the country level measure of Long-Term Orientation (LTO) from Hofstede and the country level average of the LTO measure from the WVS and from the ESS for the sample in section 5. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

- **Restraint vs. Indulgence**: This is a renormalization of the Indulgence vs. Restraint variable of Hofstede et al. (2010). Scale between 0 (short term-orientation) and 100 (Long-Term Orientation). This variable by construction captures certain aspects of LTO.

C.1.2 Measures of Education, Saving and Smoking Behavior

- Education (country-level): Years of Schooling from World Development Indicators
- Tertiary Education (2nd-generation migrants): Based on the highest level of education obtained by the individual (edulvla). Tertiary education=1 if highest level of education = Post-secondary non-tertiary education or Tertiary education completed (i.e., edulvla = 4 or 5)
- Saving Behavior: Based on the answer to the question "Please think about all types of savings such as bank accounts, investments, private and company pensions as well as property. Are you currently saving or have you saved in the past specifically in order to live comfortably in your old age?". Original answers have been recoded so that "Yes=1" and "No=0".
- Smoking (Habit): Based on GSS answer to the question "Does respondent smoke?"
- Smoking (Ever): Based on GSS answer to the question "Has respondent ever smoked?"

C.1.3 Measures of Technology and Agricultural Intensity

- Dependence on Agriculture: Taken from Ethnographic Atlas (v5)
- Dependence on Animal Husbandry: Taken from Ethnographic Atlas (v4)
- Dependence on Fishing: Taken from Ethnographic Atlas (v3)
- Dependence on Hunting: Taken from Ethnographic Atlas (v2)
- Dependence on Gathering: Taken from Ethnographic Atlas (v1)
- Agricultural Intensity: Based on "Intensity of Agriculture" from Ethnographic Atlas (v28). Defined as "Agricultural Intensity"=1 if "Intensity of Agriculture" is "extensive or shifting agriculture", "intensive agriculture", or "intensive irrigated agriculture" (i.e., if v28=3 or 5 or 6) and "Agricultural Intensity"=0 otherwise.
- Subsistence on Agriculture: Based on "Subsistence Economy" in Ethnographic Atlas (v42). Defined as "Subsistence on Agriculture" = 1 if "Subsistence Economy" is "agriculture contributes most, type unknown", "extensive agriculture contributes most", or "intensive agriculture contributes most" (i.e., v42=6 or 1 or 2), and "Subsistence on Agriculture" = 0 otherwise.
- Major Technological Changes: Based on "Major Technological Changes" in Standard Cross-Cultural Sample (SCCS v1811). Defined as "Major Technological Changes"=1 if 1 or more changes are present (i.e., v1811> 1)
- Sum of Technological Changes: Based on "Sum of Technological Changes" in Standard Cross-Cultural Sample (SCCS v1845). Recoded to start at 0.

C.2 Main Independent Variables: Crop Yield and Growth Cycle

The Global Agro-Ecological Zones (GAEZ) project of the Food and Agriculture Organization (FAO) presents data on the following crops: alfalfa, banana, barley, buckwheat, cabbage, cacao, carrot, cassava, chickpea, citrus, coconut, coffee, cotton, cowpea, dry pea, flax, foxtail millet, greengram, groundnuts, indigo rice, maize, oat, oilpalm, olive, onion, palm heart, pearl millet, phaseolus bean, pigeon pea, rye, sorghum, soybean, sunflower, sweet potato, tea, tomato, wetland rice, wheat, spring wheat, winter wheat, white potato, yams, giant yams, subtropical sorghum, tropical highland sorghum, tropical lowland, sorghum, white yams. For each crop GAEZ provides a grid with cells of size $5' \times 5'$ (i.e., approximately 100 km^2). The analysis uses the following two measures:

- **Crop yield (tons)**: agro-climatic yield under low input settings in tons per hectare per year, taken from FAO's GAEZ project available at `gaez.fao.org`.
- **Crop growth cycle (days)**: growth cycle in days under low input settings and agro-climatic conditions, taken from FAO's GAEZ project available at `gaez.fao.org`.[36]

The analysis converts the yield in tons for each crop into yield in calories, by multiplying the caloric content in each ton of the crop by the crop yield in tons. Table A.1 shows the caloric content for 100mg of each crop. The source is

- **Caloric content of crops**: United States Department of Agriculture Nutrient Database for Standard Reference. This paper uses revision 25 accessed on October 29, 2013. Data can be accessed at `http://www.ars.usda.gov/Services/docs.htm?docid=23635`.

Given the constructed grids of caloric yield per crop, the analysis selects for each $5' \times 5'$ cell the crop that maximizes caloric content across all crops or the crops available in the cell's region before the Columbian Exchange as shown in table A.2. So, the main independent variables are

- **(Modern, post-1500CE) Crop Yield**: Maximum caloric yield produced across all crops for a $5' \times 5'$ cell under agro-climatic conditions and low inputs.
- **(Modern, post-1500CE) Crop Growth Cycle**: Growth cycle of the crop that maximizes caloric yield across all crops for a $5' \times 5'$ cell under agro-climatic conditions and low inputs.
- **(Pre-1500CE) Crop Yield**: Maximum caloric yield produced across crops available pre-1500CE for a $5' \times 5'$ cell under agro-climatic conditions and low inputs.
- **(Pre-1500CE) Crop Growth Cycle**: Growth cycle of the crop that maximizes caloric yield across crops available pre-1500CE for a $5' \times 5'$ cell under agro-climatic conditions and low inputs.
- **(Post-1500CE) Crop Yield Change**: Change in maximum caloric yield produced by expansion in crops post-1500CE for a $5' \times 5'$ cell under agro-climatic conditions and low inputs.
- **(Post-1500CE) Crop Growth Cycle Change**: Change in growth cycle produced by expansion in crops post-1500CE for a $5' \times 5'$ cell under agro-climatic conditions and low inputs.

More information and data is available at the Caloric Suitability Index Site (`http://ozak.github.io/Caloric-Suitability-Index/`).

[36]Growth cycle for hibernating crops are the days elapsed from onset of post-dormancy period to full maturity.

C.3 Controls

- **Absolute latitude**: The absolute value of the latitude of a country's approximate geodesic centroid, as reported by the CIA's World Factbook.

- **Mean Elevation**: The mean elevation of a country in km above sea level, calculated using geospatial elevation data reported by the G-ECON project (Nordhaus et al., 2006) at a 1-degree resolution. The interested reader is referred to the G-ECON project web site for additional details.

- **Terrain roughness**: The degree of terrain roughness of a country, calculated using geospatial surface undulation data reported by the G-ECON project (Nordhaus et al., 2006) at a 1-degree resolution. The interested reader is referred to the G-ECON project web site for additional details.

- **Mean distance to nearest waterway**: The distance, in thousands of km, from a GIS grid cell to the nearest ice-free coastline or sea-navigable river, averaged across the grid cells of a country. This variable was originally constructed by Gallup et al. (1999) and is part of Harvard University's CID Research Datasets on General Measures of Geography.

- **Percentage of population living in tropical, subtropical and temperate zones**: The percentage of a country's population in 1995 that resided in areas classified as tropical by the Köppen-Geiger climate classification system. This variable was originally constructed by Gallup et al. (1999) and is part of Harvard University's CID Research Datasets on General Measures of Geography.

- **Land Suitability**: Average probability within a region that a particular grid cell will be cultivated as computed by Ramankutty et al. (2002).

- **Land Suitability (Range)**: Range of probabilities within a region that a particular grid cell will be cultivated as computed by Ramankutty et al. (2002).

- **Land Suitability (Gini**: Gini of probabilities within a region that a particular grid cell will be cultivated as computed by Ramankutty et al. (2002).

- **Land Suitability (Std.)**: Standard deviation of probabilities within a region that a particular grid cell will be cultivated as computed by Ramankutty et al. (2002).

- **Island nation dummy**: An indicator for whether or not a country shares a land border with any other country, as reported by the CIA's World Factbook online.

- **Landlocked dummy**: An indicator for whether or not a country is landlocked, as reported by the CIA's World Factbook online.

- **Neolithic Transition Timing**: The number of thousand years elapsed (as of the year 2000) since the majority of the population residing within a country's modern national borders began practicing sedentary agriculture as the primary mode of subsistence (Putterman, 2008). See the Agricultural Transition Data Set website
`http://www.econ.brown.edu/fac/louis_putterman/agricultural%20data%20page.htm`
for additional details on primary data sources and methodological assumptions.

- **Total land area**: The total land area of a country, in millions of square kilometers, as reported for the year 2000 by the World Bank's World Development Indicators online.

- **Population Density in 1500CE**: Population density (in persons per square km) in 1500CE as reported by McEvedy and Jones (1978), divided by total land area, as reported by the World Bank's World Development Indicators.
- **Urbanization Rate in 1500CE and 1800CE**: Share of population living in cities as reported in Acemoglu et al. (2005).
- **GDP per capita in 1870CE, 1913CE**: Income per capita as reported by Maddison (2003). The data is available at `http://www.ggdc.net/maddison/Historical_Statistics/horizontal-file_02-2010.xls`.
- **Years of Schooling**: Average number of years of schooling in 2005 as measured by Barro and Lee (2013).
- **Major religion shares**: Share of major religion in each country as reported in La Porta et al. (1999).
- **Legal Origins**: Dummy variables for origin of legal system as identified in La Porta et al. (1999).
- **Historical Plough Use**: Share of country's ancestral populations that had experience with the plough as reported in Alesina et al. (2013).
- **Strong Future Time Reference**: Share of individuals in country that speak a language with strong future time reference as reported in Chen (2013). A language has a strong future time reference if the future tense is grammatically different from the present tense and it is obligatory to make the distinction. See Chen (2013) for additional details.
- **Exchange Medium in 1000BCE, 1CE and 1000CE**: Level of sophistication of medium of exchange as reported in Comin et al. (2010).
- **Transportation Medium in 1000BCE, 1CE and 1000CE**: Level of sophistication of medium of exchange as reported in Comin et al. (2010).
- **Pre-Industrial Distance to Trade Route**: Number of weeks of travel from a country's capital to the closest trade route as reported in Özak (2012).
- **Volatility (temperature and precipitation)**: Volatility of temperature and precipitation constructed using v3.2 of the Climatic Research Unit (CRU) database following the method of Durante (2010).
- **Diversification (temperature and precipitation)**: Spatial Correlation of temperature and precipitation shocks constructed using v3.2 of the Climatic Research Unit (CRU) database following the method of Durante (2010).
- **Age Dependency Ratio in 2005**: Ratio of dependents–people younger than 15 or older than 64–to the working-age population–those ages 15-64 for the year 2005 from the World Bank's World Development Indicators.
- **Life Expectancy at Birth**: Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life. Data for the year 2005 from the World Bank's World Development Indicators.

- **GDP per capita**: GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2005 U.S. dollars for the year 2005 from the World Bank's World Development Indicators and for 2005 from Penn World Table v8 Alan Heston and Aten (2011).

- **Average Inequality 1980-2009**: Average Gini for the period 1980-2009 from the World Bank's World Development Indicators. Gini index measures the extent to which the distribution of income or consumption expenditure among individuals or households within an economy deviates from a perfectly equal distribution.

- **Net and Market inequality 2000**: Net and market Inequality are taken from version 5 of the Standardized World Income Inequality Database (Solt, 2009). Net inequality measures inequality after taxes and market inequality before taxes.

- **Savings**: Gross domestic saving rate in 2005 from the World Bank's World Development Indicators.

- **OPEC**: Dummy variable that shows if a country belongs to the OPEC, as reported by the CIA's World Factbook.

- **Institutions**: Democracy index from Polity IV project.

- **Trust**: Share of population that have generalized trust. Based on the following question taken from the integrated file for waves 1-5 of the WVS: "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?". An individual has trust if she answered "Most people can be trusted".

- **Power Distance**: Dimension of national culture identified by Hofstede (2001), which measures the degree to which there exists a preference for hierarchical power structures or inequality in economic, political or other societal dimensions. Scale between 0 (Horizontal) to 100 (Vertical).[37]

- **Individualism**: Dimension of national culture identified by Hofstede (2001), which measures the degree to which a society is individualistic as opposed to collectivistic. Scale between 0 (Collectivistic) to 100 (Individualistic).[38]

- **Cooperation**: Dimension of national culture identified by Hofstede (2001), which measures the degree to which a society is cooperative. Scale between 0 (Non-cooperative) to 100 (Cooperative).[39]

[37]Hofstede et al. (2010, p.61) defines it as "Power distance can therefore be defined as the extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally. Institutions are the basic elements of society, such as the family, the school, and the community; organizations are the places where people work."

[38]Hofstede et al. (2010, p.92) defines it as follows: "Individualism pertains to societies in which the ties between individuals are loose: everyone is expected to look after him- or herself and his or her immediate family. Collectivism as its opposite pertains to societies in which people from birth onward are integrated into strong, cohesive in-groups, which throughout people's lifetime continue to protect them in exchange for unquestioning loyalty."

[39]Hofstede et al. (2010, p.140) defines this dimension as Masculinity vs Femeninity, since he found gender based differences in the answers to the questions that defined this value.

- **Uncertainty Avoidance**: Dimension of national culture identified by Hofstede (2001), which measures the degree to which a society is tolerant of the ambiguous and the unpredictable. Scale between 0 (Intolerant) to 100 (Tolerant).[40]

- **Ancestry Adjusment**: Original data is adjusted by ancestry using the method and data from Putterman and Weil (2010).

- **Regional Data**: For regions within a country, data is computed using GIS software to compute the area of each region's polygon in the corresponding shape file of the Seamless Digital Chart of the World. Whenever possible, the same primary data sources as the ones used in the sources for the country level data is used. E.g. regional agricultural suitability is constructed using the data from Ramankutty et al. (2002).

- **Individual level controls**: Age, Gender, Education level, Health condition, Religiosity, Income for each individual in the ESS and WVS data sets.

Table C.1: Summary Statistics (Country-level Sample)

	Mean	Std.	Min	Max	N
Long-Term Orientation	45.61	(23.36)	4.00	100.00	87
Thrift important in children	57.51	(21.70)	13.04	100.00	87
Crop Yield	8.57	(2.73)	1.33	17.99	87
Crop Growth Cycle	135.81	(17.13)	89.91	189.29	87
Crop Yield (Anc.)	8.42	(2.26)	1.83	13.90	87
Crop Growth Cycle (Anc.)	135.87	(15.58)	89.91	188.31	87
Crop Yield (pre-1500)	7.45	(2.68)	0.87	17.99	87
Crop Growth Cycle (pre-1500)	132.22	(16.33)	82.90	169.50	87
Crop Yield (Anc., pre-1500)	7.35	(1.92)	1.25	10.12	87
Crop Growth Cycle (Anc., pre-1500)	131.43	(14.33)	86.74	161.41	87
Crop Yield Change (post-1500)	1.13	(1.54)	-0.47	6.16	87
Crop Growth Cycle Change (post-1500)	3.59	(8.94)	-23.00	34.79	87
Crop Yield Change (Anc., post-1500)	1.07	(1.29)	-0.12	5.69	87
Crop Growth Cycle Change (Anc., post-1500)	4.43	(8.34)	-23.00	34.17	87
Crop Yield (pre-1500)	6.11	(3.57)	0.00	10.69	87
Crop Growth Cycle (pre-1500)	98.04	(55.81)	0.00	169.50	87
Crop Yield (pre-1500)	6.11	(3.57)	0.00	10.69	87
Crop Growth Cycle (Anc., pre-1500)	99.26	(48.88)	0.00	159.23	87
Crop Yield Change (post-1500)	1.70	(1.61)	0.00	6.49	87
Crop Growth Cycle Change (post-1500)	29.89	(18.94)	0.00	90.00	87
Crop Yield Change (Anc., post-1500)	1.69	(1.38)	0.01	5.69	87
Crop Growth Cycle Change (Anc., post-1500)	30.15	(17.14)	0.15	84.50	87
Absolute Latitude	34.27	(17.19)	1.00	64.00	87
Mean Elevation	0.52	(0.44)	0.02	2.43	87
Terrain Roughness	0.19	(0.13)	0.02	0.60	87
Distance to Coast or River	282.25	(408.02)	7.95	2385.58	87
Landlocked	0.18	(0.39)	0.00	1.00	87
Island	0.13	(0.33)	0.00	1.00	87

[40] According to Hofstede et al. (2010, p.191) "Uncertainty avoidance can therefore be defined as the extent to which the members of a culture feel threatened by ambiguous or unknown situations."

Table C.1: Summary Statistics (continued)

	Mean	Std.	Min	Max	N
Pct. Land in Tropics and Subtropics	0.23	(0.38)	0.00	1.00	87
Pct. Land in Tropics	0.19	(0.35)	0.00	1.00	87
Pct. Land in Temperate Zone	0.48	(0.45)	0.00	1.00	87
Precipitation	81.20	(51.63)	2.91	233.93	87
Temperature	14.67	(8.39)	-7.93	28.64	87
Total land area	1.12	(2.63)	0.00	16.38	87
Total land area (Ancestors)	1.14	(2.18)	0.02	15.74	87
Temperature Volatility	13.16	(5.46)	3.70	27.38	87
Temperature Volatility (Ancestors)	13.55	(5.03)	3.85	27.11	87
Precipitation Volatility	368.58	(194.28)	27.90	943.01	87
Precipitation Volatility (Ancestors)	352.51	(161.17)	34.91	943.01	87
Temperature Diversification	0.85	(0.20)	0.00	1.00	87
Temperature Diversification (Ancestors)	0.86	(0.16)	0.03	1.00	87
Precipitation Diversification	0.80	(0.19)	0.00	0.98	87
Precipitation Diversification (Ancestors)	0.80	(0.15)	0.03	0.97	87
Neolithic Transition Timing	5422.99	(2356.96)	400.00	10500.00	87
Neolithic Transition Timing (Anc.)	5996.87	(1886.92)	1480.00	10400.00	87
Land Suitability	0.42	(0.24)	0.00	0.96	85
Land Suitability (Anc.)	0.43	(0.21)	0.02	0.81	85
Land Suitability (Gini)	0.37	(0.23)	0.03	0.87	84
Land Suitability (Range)	0.78	(0.23)	0.03	1.00	84
Land Suitability	0.70	(0.31)	0.01	1.00	85
Land Suitability (Anc.)	0.71	(0.27)	0.02	1.00	85
Population density in 1500 CE	9.32	(11.85)	0.02	62.50	87
Urbanization rate in 1500 CE	7.36	(5.43)	0.00	28.00	65
Urbanization rate in 1800 CE	0.15	(0.39)	0.00	3.50	84
GDPpc 1870 (Maddison updated)	1247.75	(805.91)	337.00	3273.00	52
GDPpc 1913 (Maddison updated)	2191.88	(1590.90)	485.00	7093.00	51
2005 yr_sch	8.82	(2.37)	1.71	12.91	80
Savings (2005)	21.76	(14.52)	-17.91	56.98	86
Plow	0.71	(0.43)	0.00	1.00	87
Plow (Anc.)	0.78	(0.34)	0.00	1.00	87
Strong FTR	0.81	(0.37)	0.00	1.00	71
Strong FTR (Anc.)	0.77	(0.35)	0.00	1.00	71
British legal origin dummy	0.25	(0.44)	0.00	1.00	87
French legal origin dummy	0.36	(0.48)	0.00	1.00	87
Socialist legal origin dummy	0.29	(0.46)	0.00	1.00	87
German legal origin dummy	0.06	(0.23)	0.00	1.00	87
Scandinavian legal origin dummy	0.05	(0.21)	0.00	1.00	87
Share of Roman Catholics in the population	33.22	(37.47)	0.00	97.30	87
Share of Muslims in the population	18.98	(32.84)	0.00	99.40	87
Share of Protestants in the population	11.74	(21.85)	0.00	97.80	87
Share of other religions in the population	36.07	(33.87)	0.00	100.00	87
Exchange Medium 1000BCE	0.24	(0.37)	0.00	1.00	81
Exchange Medium 1CE	0.53	(0.42)	0.00	1.00	81
Exchange Medium 1000CE	0.75	(0.41)	0.00	1.00	81

Table C.1: Summary Statistics (continued)

	Mean	Std.	Min	Max	N
Transportation Medium 1000BCE	0.48	(0.39)	0.00	1.00	81
Transportation Medium 1CE	0.63	(0.37)	0.00	1.00	81
Transportation Medium 1000CE	0.75	(0.40)	0.00	1.00	81
Pre-Industrial Distance to Trade Route	0.41	(1.17)	0.00	8.82	71
Age Dependency Ratio	55.04	(14.26)	39.02	108.10	87
Life Expectancy at Birth	71.40	(9.30)	41.47	81.93	87
Ln[GPD per capita]	9.08	(1.20)	5.78	11.20	87
Net Inequality 2000	36.22	(8.52)	22.04	57.17	85
Market Inequality 2000	44.52	(7.02)	27.88	66.35	85
Average Inequality (80-09)	37.08	(8.34)	23.94	60.85	85
Population density in 1500 CE	9.32	(11.85)	0.02	62.50	87
Log[Pop. Dens (1500)]	1.36	(1.68)	-3.91	4.15	82

Table C.2: List of countries included in different analyses

Sample	Countries
Country-level Analysis	Albania, Algeria, Argentina, Armenia, Australia, Austria, Azerbaijan, Bangladesh, Belgium, Bosnia and Herzegovina, Brazil, Bulgaria, Burkina Faso, Belarus, Canada, Chile, China, Colombia, Croatia, Czech Republic, Denmark, Dominican Republic, Egypt, El Salvador, Estonia, Finland, France, Georgia, Germany, Ghana, Greece, Hungary, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Japan, Jordan, Republic of Korea, Kyrgyzstan, Latvia, Lithuania, Luxembourg, Macedonia, Malaysia, Mali, Malta, Mexico, Moldova, Morocco, Netherlands, New Zealand, Nigeria, Norway, Pakistan, Peru, Philippines, Poland, Portugal, Romania, Russia, Rwanda, Saudi Arabia, Serbia, Singapore, Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, United Republic of Tanzania, Thailand, Trinidad, Turkey, Uganda, Ukraine, United Kingdom, United States, Uruguay, Venezuela, Vietnam, Zambia, Zimbabwe
Second-Generation Migrant Analysis	Country of Interview
	Austria, Belgium, Bulgaria, Switzerland, Cyprus, Germany, Denmark, Estonia, Spain, Finland, France, United Kingdom, Hungary, Ireland, Netherlands, Norway, Poland, Portugal, Russian Federation, Sweden, Slovenia, Slovakia, Ukraine
	Country of Origin Mother
	Angola, Albania, Argentina, Armenia, Austria, Azerbaijan, Belgium, Bangladesh, Bosnia, Belarus, Canada, Switzerland, Chile, China, Colombia, Czech Republic, Germany, Algeria, Egypt, Spain, Estonia, Finland, France, United Kingdom, Georgia, Ghana, Guinea, Guinea Bissau, Greece, Croatia, Hungary, India, Indonesia, Ireland, Italy, Jamaica, Kazakhstan, Kenya, Kyrgyzstan, Cambodia, Laos, Lebanon, Sri Lanka, Luxembourg, Latvia, Morocco, Madagascar, Macedonia, Mozambique, Malaysia, Nigeria, Netherlands, Norway, Pakistan, Poland, Portugal, Puerto Rico, Russian Federation, Slovakia, Sweden, Syria, Tunisia, Turkey, Uganda, Ukraine, Uzbekistan, Vietnam
Individual-Level and Regional Analyses	Countries
	Albania, Algeria, Argentina, Armenia, Australia, Austria, Azerbaijan, Bangladesh, Belarus, Belgium,Bosnia and Herzegovina, Brazil, Bulgaria, Burkina Faso, Canada, Chile, China, Colombia, Cyprus, Czech Republic, Denmark, Dominican Republic, Egypt, El Salvador, Estonia, Ethiopia, Finland, France, Georgia, Germany, Ghana, Greece, Guatemala, Hungary, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Japan, Jordan, Korea, South, Kyrgyzstan, Latvia, Lithuania, Luxembourg, Macedonia, Malaysia, Mali, Malta, Mexico, Moldova, Morocco, Netherlands, New Zealand, Nicaragua, Nigeria, Norway, Pakistan, Peru, Philippines, Poland, Romania, Russia, Rwanda, Saudi Arabia, Serbia, Singapore, Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, Tanzania, Thailand, Trinidad and Tobago, Turkey, Uganda, Ukraine, United Kingdom, United States, Uruguay, Venezuela, Vietnam, Zambia, Zimbabwe

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